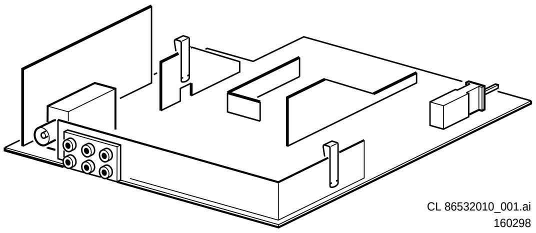
**Colour Television** **Chassis**

# L7.3A
## AA

Service
Service
Service



# Service Manual

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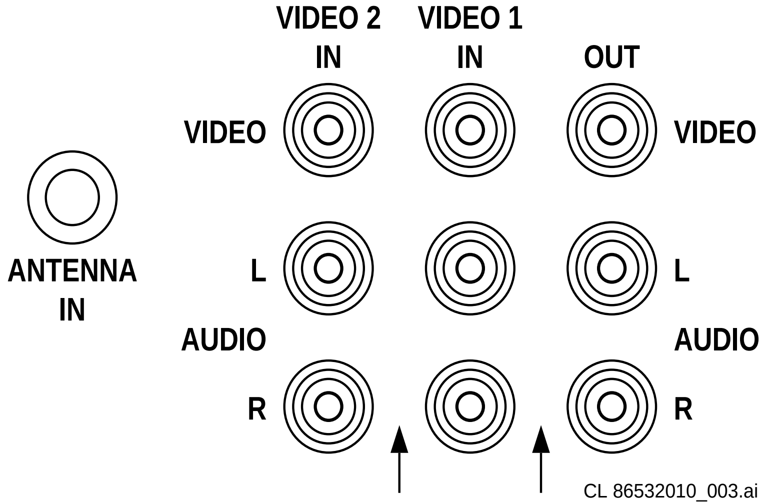
PHILIPS

# 1 Technical specifications

| | |
|---|---|
| Mains Voltage: | : 150 - 276 Volt |
| | : 90 - 276 Volt |
| Mains frequency | : 50 Hz |
| | : 60 Hz |
| Power Consumption in stand-by | : < 10 Watt |
| Power Consumption normal mode | : 25” : 75Watt +/- 10% |
| | : 29” : 90 Watt +/- 10% |
| Chassis mains isolated | : Yes |
| Aerial input impedance TV | : 75 Ohm - coax |
| Picture tube range | : 25” and 29” |
| EHT voltage for 25” | : 27 KVolt |
| EHT voltage for 29” | : 30 KVolt |
| Max EHT power | : Linitted at 33 Watt |
| Sound output power | : 2 X 3 Watt |
| | : 2 X 5 Watt |
| Picture S/N at 70uVolts | : > 46 dB unweighted |
| | : > 53 dB weigted |

# 2 Connection facilities


VIDEO 2
IN
VIDEO 1
IN
OUT
VIDEO
VIDEO
ANTENNA
IN
L
L
AUDIO
AUDIO
R
R

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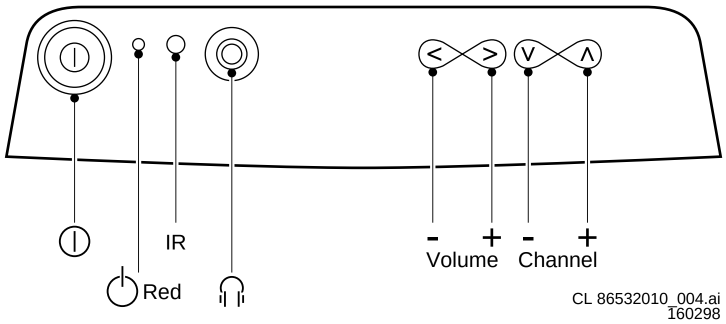
IR
-
+
-
+
Volume
Channel
Red

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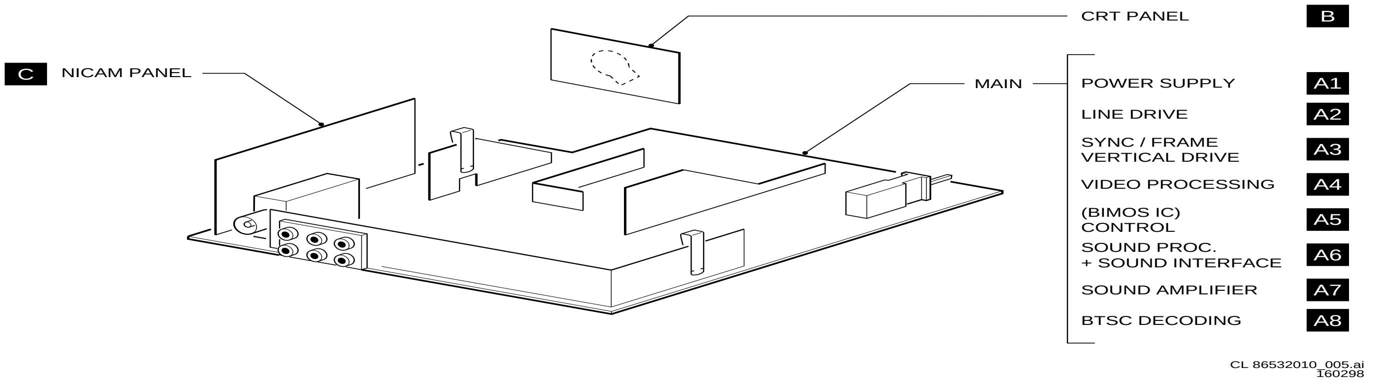
## 2.1 Cinch

| | | | |
|---|---|---|---|
| - | Video | 1Vpp/75Ω | ◎ |
| - | Audio | L(0.5Vrms ≥10kΩ) | ◎ |
| - | Audio | R(0.5Vrms ≥10kΩ) | ◎ |

## 2.2 Head phone

- (8 - 600Ω / 4mW)

## 2.3 Location of panels


C
NICAM PANEL
CRT PANEL
B
MAIN
POWER SUPPLY
A1
LINE DRIVE
A2
SYNC / FRAME VERTICAL DRIVE
A3
VIDEO PROCESSING
A4
(BIMOS IC) CONTROL
A5
SOUND PROC. + SOUND INTERFACE
A6
SOUND AMPLIFIER
A7
BTSC DECODING
A8

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# 3 Safety instructions, Maintenance instruction,

## 3.1 Safety instructions for repairs

Figure 3-1

1. Safety regulations require that during a repair:
   - the set should be connected to the mains via an isolating transformer;
   - safety components, indicated by the symbol (see fig. 3.1), should be replaced by components identical to the original ones;
   - when replacing the CRT, safety goggles must be worn.

2. Safety regulations require that after a repair the set must be returned in its original condition. In particular attention should be paid to the following points.
   - As a strict precaution, we advise you to resolder the solder joints through which the horizontal deflection current is flowing, in particular:
     - all pins of the line output transformer (LOT);
     - fly-back capacitor(s);
     - S-correction capacitor(s);
     - line output transistor;
     - pins of the connector with wires to the deflection coil;
     - other components through which the deflection current flows.

     Note: This resoldering is advised to prevent bad connections due to metal fatigue in solder joints and is therefore only necessary for television sets older than 2 years. The wire trees and EHT cable should be routed correctly and fixed with the mounted cable clamps.

   - The insulation of the mains lead should be checked for external damage.
   - The mains lead strain relief should be checked for its function in order to avoid touching the CRT, hot components or heat sinks.
   - The electrical DC resistance between the mains plug and the secondary side should be checked (only for sets which have a mains isolated power supply). This check can be done as follows:
     - unplug the mains cord and connect a wire between the two pins of the mains plug;
     - set the mains switch to the on position (keep the mains cord unplugged!);
     - measure the resistance value between the pins of the mains plug and the metal shielding of the tuner or the aerial connection on the set. The reading should be between 4.5 MW and 12 MW;
     - switch off the TV and remove the wire between the two pins of the mains plug.

   - The cabinet should be checked for defects to avoid touching of any inner parts by the customer.

## 3.2 Maintenance instruction

It is recommended to have a maintenance inspection carried out by a qualified service employee. The interval depends on the usage conditions:

- When the set is used under normal circumstances, for example in a living room, the recommended interval is 3 to 5 years.
- When the set is used in circumstances with higher dust, grease or moisture levels, for example in a kitchen, the recommended interval is 1 year.
- The maintenance inspection contains the following actions:
  - Execute the above mentioned 'general repair instruction'.
  - Clean the power supply and deflection circuitry on the chassis.
  - Clean the picture tube panel and the neck of the picture tube.

## 3.3 Warnings

1. ESD
   All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce life drastically. When repairing, make sure that you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this same potential.
   - Available ESD protection equipment:
   - anti-static table mat (large 1200x650x1.25mm) 4822 466 10953
   - anti-static table mat (small 600x650x1.25mm) 4822 466 10958
   - anti-static wristband 4822 395 10223
   - connection box (3 press stud connections, 1 M ohm) 4822 320 11307
   - extension cable (2 m, 2 M ohm; to connect wristband to connection box) 4822 320 11305
   - connecting cable (3 m, 2 M ohm; to connect table mat to connection box) 4822 320 11306
   - earth cable (1 M ohm; to connect any product to mat or connection box) 4822 320 11308
   - complete kit ESD3 (combining all 6 prior products - small table mat) 4822 310 10671
   - wristband tester 4822 344 13999

2. In order to prevent damage to ICs and transistors, all high-voltage flashovers must be avoided. In order to prevent damage to the picture tube, the method shown in Fig. 3.2 should be used to discharge the picture tube. Use a high-voltage probe and a multimeter (position DC-V). Discharge until the meter reading is 0V (after approx. 30s).
3. Together with the deflection unit and any multipole unit, the flat square picture tubes used from an integrated unit. The deflection and the multipole units are set optimally at the factory. Adjustment of this unit during repair is therefore not recommended.
4. Be careful during measurements in the high-voltage section and on the picture tube.
5. Never replace modules or other components while the unit is switched on.
6. When making settings, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable.
7. Wear safety goggles during replacement of the picture tube

## 3.4 Notes

1. The direct voltages and oscillograms should be measured with regard to the tuner earth , or hot earth as this is called (see fig. 3.3)
2. The direct voltages and oscillograms shown in the diagrams are indicative and should be measured in the Service Default Mode (see chapter 8) with a colour bar signal and stereo sound (L:3 kHz, R:1 kHz unless stated otherwise) and picture carrier at 475.25 MHz.

3. Where necessary, the oscillograms and direct voltages are measured with and without aerial signal. Voltages in the power supply section are measured both for normal operation and in standby . These values are indicated by means of the appropriate symbols (see fig. 3.3).
4. The picture tube PWB has printed spark gaps. Each spark gap is connected between an electrode of the picture tube and the Aquadag coating.
5. The semiconductors indicated in the circuit diagram and in the parts lists are completely interchangeable per position with the semiconductors in the unit, irrespective of the type indication on these semiconductors.

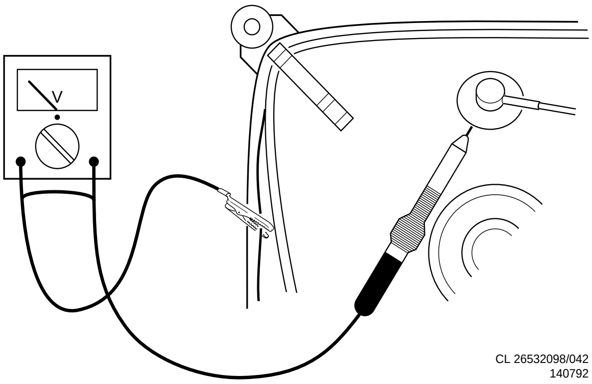

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Figure 3-2

| | | | |
|---|---|---|---|
| ⊥ | tuner earth<br>tuner aarde<br>la masse du tuner<br>Tuner-Erde<br>massa del tuner<br>tierra del sintonizador | ⊥ϟ | hot earth<br>hete aarde<br>la terre directe<br>heißen Erde<br>massa calda<br>tierra caliente |
| ╥ | with aerial signal<br>met antenne signaal<br>avec signal d'antenne<br>mit Antennensignal<br>con segnale d'antenna<br>con la señal de antena | ╳ | without aerial signal<br>zonder antenne signaal<br>sans signal d'antenne<br>.ohne Antennensignal<br>senza segnale d'antenna<br>sin la señal de antena |
| ⏼ | normal condition<br>normaal bedrijf<br>fonctionnement normal<br>normaler Betrieb<br>funzionamento normale<br>funcionamiento normal | ⏻ | stand by<br>stand by<br>position de veille<br>in Bereitschaft<br>modo di attesa<br>posición de espera |

Figure 3-3

# 4 Mechanical instructions

For the service position of the main carrier see figure 4.1: The main carrier can be removed by releasing the 2 carrier blocking lips (1) and pulling the carrier panel backwards.

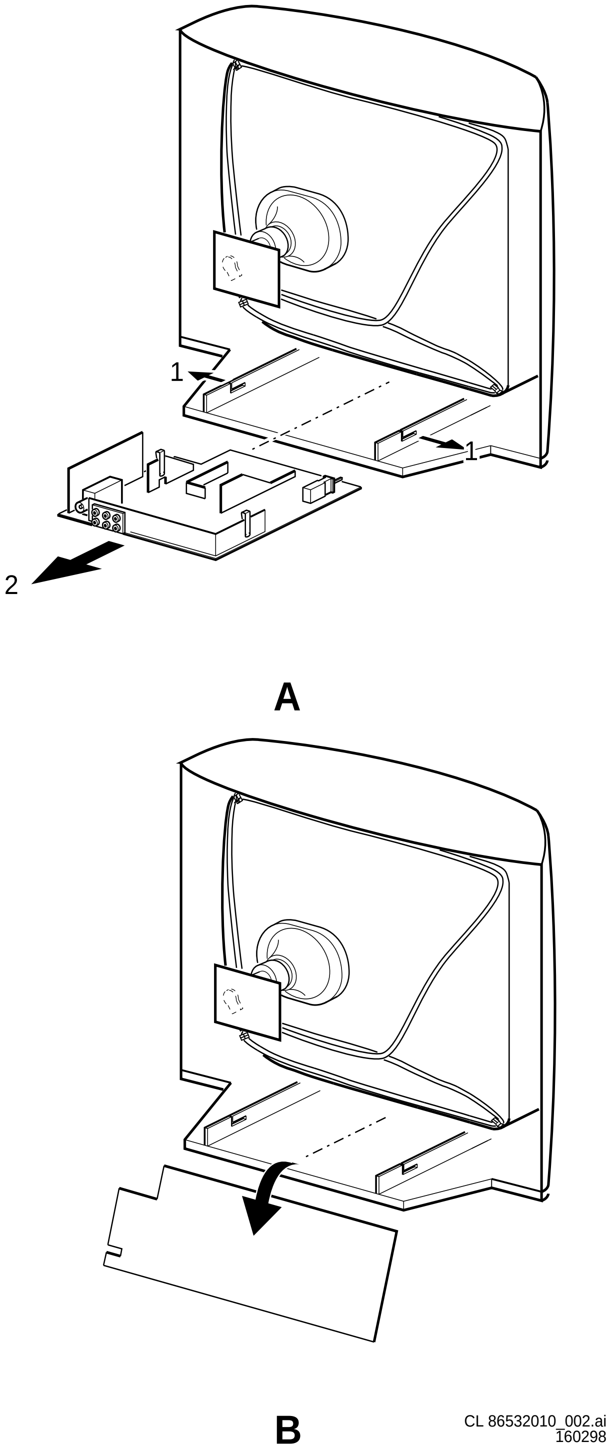
1
1
2
A
B
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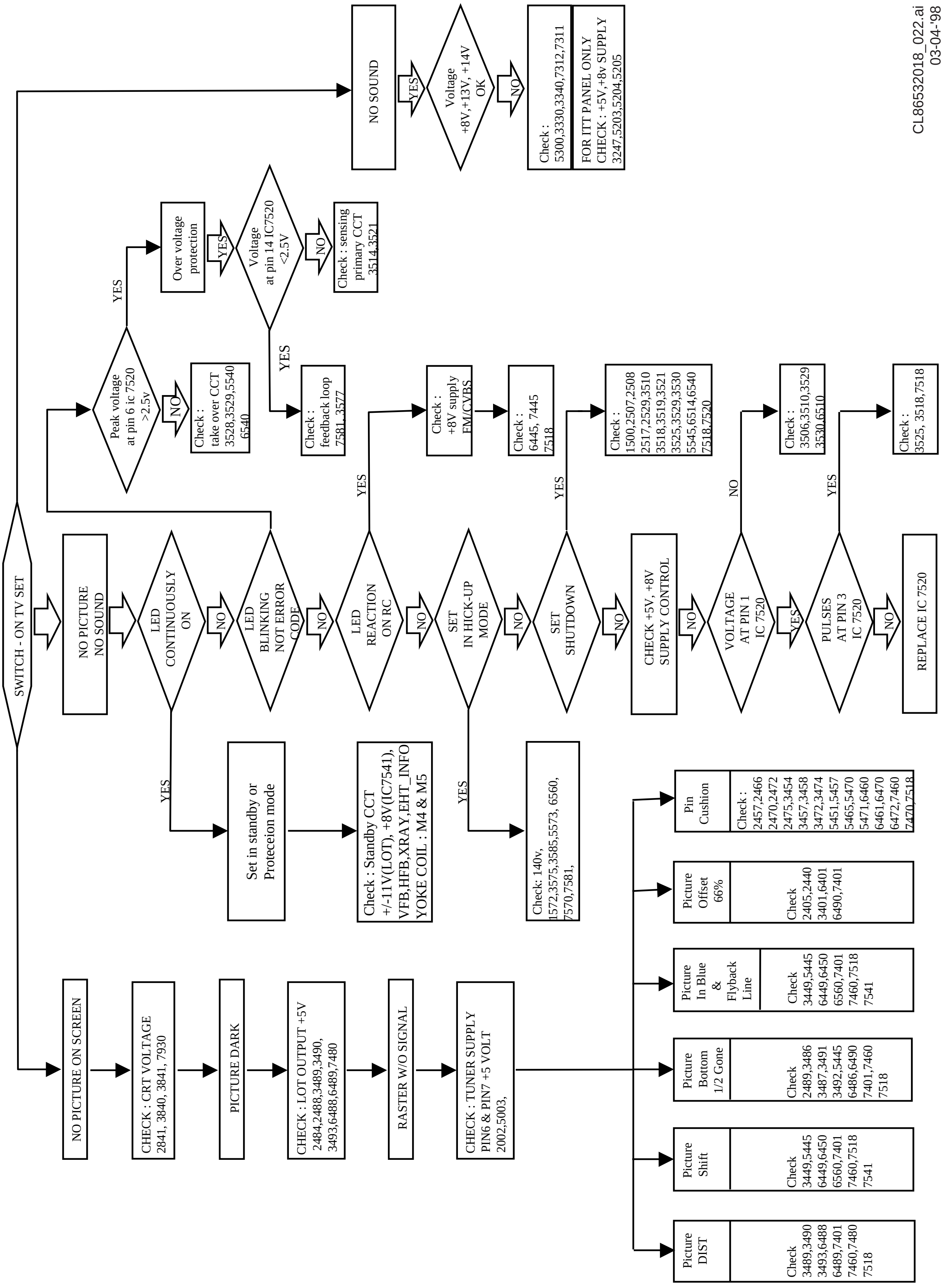
**Figure 4-1**

# 5 Faultfinding tree & Repair facilities


SWITCH - ON TV SET
NO PICTURE NO SOUND
LED CONTINUOUSLY ON
NO
YES
Set in standby or Proteceion mode
Check : Standby CCT +/-11V(LOT), +8V(IC7541), VFB,HFB,XRAY,EHT_INFO YOKE COIL : M4 & M5
LED BLINKING NOT ERROR CODE
NO
Peak voltage at pin 6 ic 7520 >2.5v
NO
Check : take over CCT 3528,3529,5540 6540
YES
Over voltage protection
YES
Voltage at pin 14 IC7520 <2.5V
NO
Check : sensing primary CCT 3514,3521
YES
Check : feedback loop 7581, 3577
LED REACTION ON RC
YES
Check : +8V supply FM/CVBS
Check : 6445, 7445 7518
NO
SET IN HICK-UP MODE
YES
Check: 140v. 1572,3575,3585,5573, 6560, 7570,7581,
NO
SET SHUTDOWN
YES
Check : 1500,2507,2508 2517,2529,3510 3518,3519,3521 3525,3529,3530 5545,6514,6540 7518,7520
NO
CHECK +5V, +8V SUPPLY CONTROL
NO
VOLTAGE AT PIN 1 IC 7520
NO
Check : 3506,3510,3529 3530,6510
YES
PULSES AT PIN 3 IC 7520
YES
Check : 3525, 3518,7518
NO
REPLACE IC 7520
NO SOUND
YES
Voltage +8V,+13V, +14V OK
NO
Check : 5300,3330,3340,7312,7311
FOR ITT PANEL ONLY CHECK : +5V,+8v SUPPLY 3247,5203,5204,5205
NO PICTURE ON SCREEN
CHECK : CRT VOLTAGE 2841, 3840, 3841, 7930
PICTURE DARK
CHECK : LOT OUTPUT +5V 2484,2488,3489,3490, 3493,6488,6489,7480
RASTER W/O SIGNAL
CHECK : TUNER SUPPLY PIN6 & PIN7 +5 VOLT 2002,5003,
Pin Cushion
Check : 2457,2466 2470,2472 2475,3454 3457,3458 3472,3474 5451,5457 5465,5470 5471,6460 6461,6470 6472,7460 7470,7518
Picture Offset 66%
Check 2405,2440 3401,6401 6490,7401
Picture In Blue & Flyback Line
Check 3449,5445 6449,6450 6560,7401 7460,7518 7541
Picture Bottom 1/2 Gone
Check 2489,3486 3487,3491 3492,5445 6486,6490 7401,7460 7518
Picture Shift
Check 3449,5445 6449,6450 6560,7401 7460,7518 7541
Picture DIST
Check 3489,3490 3493,6488 6489,7401 7460,7480 7518

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# 5 Faultfinding tree & Repair facilities

## 5.1 Repair facilities

## 5.2 Functional blocks

The PCB has service printing on both sides , so on the copper and the component side. Functional blocks are indicated by lines and text.

Test points are referring to the functional blocks as mentioned above :

- Test pointElectrical function
- P1, P2, etc. :Power supply
- L1, L2, etc. :Line drive and line output
- F1, F2, etc. :Frame drive and frame output
- S1, S2, etc. :Synchronization
- V1, V2, etc.: Video
- A1, A2, etc.: Audio
- C1, C2, etc.:Control
- B1, B2, etc : BTSC stereo decoding
- N1, N2, etc.:NICAM stereo decoding

The numbering is done in for a diagnostics logical sequence.

Example: Checking the power supply, start with test point P1, P2 etc.

## 5.3 Service mode

The service mode is a pre-defined mode which can be used for faultfinding and adjustments (especially when the TV gives no picture at all you can use the service default mode). All oscillograms and DC voltages in this service manual are measured in the service default mode.

The service mode is split into two parts :

- Service Default Mode (SDM).
- Service Alignment Mode (SAM).

SDM. In the service default mode you are able to carry out (hardware) measurements under pre-defined conditions. To entry the (SDM) Service Default Mode there are two possibilities:

- Via the "DEFAULT" button on the Dealer Service Tool, service codenumber : 4822 218 21232.
- Via Short-circuiting the service pins M24 and M25 on PCB and switching on the set via the mains switch. For M25 and M24 see Diagram A4 and the PWB drawing of the main panel

In the SDM mode a "S" (in green) and the menu (in red) is displayed (see Fig. 1).

SAM. In the SAM mode you are able to align/adjust settings via menu selection. To entry the (SAM) Service Alignment Mode there are two possibilities :

- Via the "ALIGN" button on the Dealer Service Tool
- Via Short-circuiting service pins M28 and M29 on PCB and switching on the set via the mains switch. For M25 and M24 see Diagram A4 and the PWB drawing of the main panel

In the SAM mode a "S" (in green) and the menu (in red) is displayed (see Fig. 2).

REMARKS: After the set is in the service mode the short circuit can be removed.

To leave the Service mode press the stand-by button on the remote control.

REMARKS : After switching off and on the mains switch, the set remains in the service mode (SDM- or SAM mode).

Features are :

- Service settings after entry
- Service (sub) menu selection
- Error buffer display
- Software version and identification display
- Life timer (run timer) display
- Option bytes

## 5.4 Initial states

The initial state after switching on in service mode for System and Tuning are as follows :

- For Multi-System sets PAL BG/SECAM/DK/NTSC
- For Bi-Norma and Tri-Norma sets NTSC/PAL-M/PAL-N

- For sets with VST tuning : Programme number 1 is selected and the system will be tuned at the tuning data (for programme 1) read from EEPROM
- For sets with PLL tuning : Set is tuned to a frequency of 475.25 MHz.

Further settings :

- The automatic switch off (no IDENT) timer and the sleep timer will be ignored
- The child lock will be disabled.
- If the TV sets was in hotel mode, this mode will be disabled as long as the TV is in service mode.
- Brightness, saturation, sharpness, contrast and balance are initialised to 50% level.
- The volume is set to 25% level.
- The TV is normally controllable.
- All displayed text strings in service mode, so SDM and SAM mode will be displayed in the English language.

Other features

RAM test of the uP (=IC7600) and the NV RAM (=IC7620). At every start-up of the TV, a read after write test for the complete RAM of IC7600 and via I2C the NVRAM (=IC7620) will be performed. If this check fails, the appropriate error number will be written in the error buffer. The patterns will be chosen in such a way that every bit of all bytes, will be written high and low. If the NVRAM is empty default values will be loaded.

## 5.5 SDM (Service Default Mode)

This menu is being displayed whenever SDM is entered. In this menu the error buffer can be inspected, and the option byte(s) can be (re)programmed. The overview of the menu is shown below :

The MENU UP/DOWN command can be used to select the next/ previous option ; the MENU LEFT/RIGHT command can be used to change the option value.

S (Service mode)

L73AP21 1.0 9999 (Life timer)
(Software version)

| | | |
|---|---|---|
| AS (options description) | VALUE | 8888 7777 66 (options bytes) |
| ERR (error buffer) | 3 4 3 0 0 (error code) | |

Explanation :

L73AP21 1.0: The software identification, version and cluster.
AS: A two character short name for the option to be selected. (see table )
VALUE: The value of the selected option.
ERR: Error buffer display
3 4 3 0 0
S: The character " S " indicates that the TV set is in the service mode.
9999: The hexadecimal value of the life timer.
8888 7777 66: 10 digits of value representation of the option byte contents

### *5.5.1 Software identification*

If there is a change of the software this number will be changed.

### *5.5.2 Life timer (run timer)*

This life timer only counts the normal operations hours and not the stand-by hours. Also at every switch- on the life timer is incremented by 1.

### *5.5.3 Option code*

The possible options are listed in the following table 1:

Error buffer

The last five errors, stored in the NVRAM=EEPROM (IC7620), are shown in the service main menu; this is called the errorbuffer. An error will be added to the buffer if this error differs from the last error in the buffer. The last found error is displayed on the left-side.

Example: Suppose the display shows: 3 4 0 0 0. This means the last found error is error number 3, the last found error but one is error number 4, and so on.

- 40000
- 34000

REMARKS: If the (IC7620=) EEPROM is replaced by a new one the set has to be installed according to the option code. The ERROR BUFFER will be erased when the set is switched from service mode in stand by, or via DST code 99.

Error codes

The following error codes have been defined :

- 0 - No error
- 1 - Internal RAM
- 2 - General 12C error
- 3 - EEPROM Configuration error (Checksum error)
- 4 - I2C error (MSP3410 / TDA9850/TDA9860)
- 5 - I2C error (TDA8374)
- 6 - EEPROM error (ST24C04)
- 7 - I2C error (PLL tuner)

### *5.5.4 Error code indication via blinking stand by LED*

The ERROR code are also indication via blinking of the standby LED. This is important if no OSD function or picture is available. The method is to show that the LED blinks as many as the error code indicates..

Example: Error code 4 will result in four blinks of the LED ( 0.25 seconds ON and 0.25 seconds OFF).After this sequence the LED will be OFF for 3 seconds and the blinking of the LED is repeated again.

### *5.5.5 Option abbreviation and Option status.*

To select another option abbreviation use the MENU UP/ DOWN buttons and to change the status use the MENU LEFT/ RIGHT buttons.

Elucidation: With above items the option statuses stored in the EEPROM can be changed. This is necessary if the EEPROM is replaced by a fresh EEPROM, because a fresh EEPROM is initial loaded with default options by the uC. The options stored in the factory can differ per type and stroke number. Therefore it is necessary to load the EEPROM with the correct options (configuration). These options are indicated on a sticker glued inside on the rear cover of the set.

Remark: For sets with BTSC sound, also the options TUN.FOA, TUN.FOB, EXT.FOA and EXT.FOB have to be set. See for these items Paragraph 6

Loading a fresh EEPROM

- Switch on the TV via the power switch.
- Audio mute the TV (to get no big noise).
- Change the option codes as indicated on the sticker on the rear cover.
- Put TV in stand by via the remote control.
- Switch on the TV again via the remote control.
- Switch OFF the TV via the power switch
- Switch on the TV again via the power switch.

In the table all the possible option abbreviation with full option name and possible status are listed.

Table 1 : Options description for L7.3 versions.

| Full option name | Option name abbreviation | Status Possibilities |
|---|---|---|
| Auto cable detect | AC | ON/OFF |
| AFC Status | AF | ON/OFF |
| Auto scan | AS | ON/OFF |
| AVL | AV | ON/OFF |
| Balance | BL | ON/OFF |
| Bilingual Mono | BM | ON/OFF |
| Bass Treble | BT | ON/OFF |
| Child Lock | CH | ON/OFF |
| Clock | CK | ON/OFF |
| Contrast plus | CP | ON/OFF |
| EW control | EW | ON/OFF |

| | | |
|---|---|---|
| 4 : 3 Expend | EX | ON/OFF |
| Games | GM | ON/OFF |
| Hospital mode | HS | ON/OFF |
| Monitor No Ident | NI | ON/OFF |
| NTSC Play Back | NP | ON/OFF |
| Spatial | SA | ON/OFF |
| Sound Board | SB | MA = Mono All |
| | | MM=Multi Mono |
| | | ND = ITT Nicam MSP3410D |
| | | NB = ITT NICAM MSP3410B |
| | | IT = ITT 2CS MSP3400 |
| | | 50 = TDA 9850 |
| | | 60 = TDA 9860 |
| | | 52 = BTSC TDA9852 |
| | | 55 = BTSC TDA9855 |
| Smart Picture Term Control | SC | ON/OFF |
| Smart Sound | SS | ON/OFF |
| Bimos Standby | ST | ON/OFF |
| Surf | SU | ON/OFF |
| Multi System | SY | AF = AP FULL MULTI |
| | | SS = SINGLE SYSTEM |
| | | AD = AP DUAL |
| | | AM = AP MULTI |
| | | 2N = Binorma |
| | | 3N= Trinorma |
| | | 4N = Fournorma |
| Tuner | TN | ON/OFF |
| Volume Limiter | VL | ON/OFF |
| Video Mute | VM | ON/OFF |
| Remote Control | W1 | ON/OFF |
| External 1 | XT | ON/OFF |
| External 2 | 2X | ON/OFF |
| TDA884X Family | 88 | ON/OFF |

**OPTION code**

OPT is the abbreviation of OPTION, this abbreviation refers to the following 12 digit hexadecimal option codes (BFDD FBEF 2C). The option code can not be selected. It only give an quick indication in hexadecimal form of the options settings of the relevant set.

### 5.6 SAM (Service Alignment Mode)

This menu is being displayed whenever SAM is entered.

In SAM you are able to make tuning adjustments, Alignment of white tone, adjustment of picture geometry, Sound alignment ,VSD and AKB enable/disable (black current loop).

The overview of the menu is shown below :

General: The following items of the sub menus can be selected with the UP(+)/DOWN(-) arrow keys on the user remote control.

Entry into the sub menus is executed with the VOL(+) / VOL(-) arrow keys.

SAM MAINS MENU

| | | |
|---|---|---|
| | | S |
| AKB | 0 | |
| VSD | 0 | |
| TUNER | > | |
| WHITE TONE | > | |
| GEOMETRY | > | |
| AUDIO | > | |

#### *5.6.1 AKB*

With the option AKB the "black current loop" can be enabled or disabled. ON =enabled, OFF = disabled.

#### *5.6.2 TUNER*

With the items TUN.FAO and TUN.FOB the speed ( time constant) for internal signals is set. The speed can be set to normal, slow or fast. The tuner sub menu contains the following information :

For monitoring during alignment of AGC,YD,CL, IF-PLL, AFW.

All entered data will be send directly to the video one chip; values are stored in EEPROM if this sub menu is left.

| | | |
|---|---|---|
| | | S |
| | TUNER | |
| AGC | | 37 |
| YD | | 1 |
| CL | | 0 |
| IF-PLL | | 61 |
| AFW | | 80 |

| | |
|---|---|
| AFA | 1 |
| AFB | 1 |

### *5.6.3 White tone*

The white tone menu contains the following information :

MAIN WHITE TONE MENU

| | S |
|---|---|
| NORMAL RED | 37 |
| DELTA COOL RED | 0 |
| DELTA WARM RED | 0 |

NORMAL TEMPERATURE SUB MENU

| | S |
|---|---|
| RED | 37 |
| GREEN | 37 |
| BLUE | 39 |

REMARK :

Only one of the 3 items (RED, GREEN or BLUE) will be display on the screen. Via "scrolling" with the UP/DOWN keys the items can be changed.

- NORMAL: Via this menu the NORMAL colour temperature alignment can be set.
- DELTA COOL : Via this menu the cool colour temperature alignment can be set
- DELTA WARM : Via this menu the normal warm temperature alignment can be set

Changing any of the items red, green or blue can be changed by first pressing the control left/right keys to highlight the desired setting. With the desired setting highlighted, the user can either increment or decrement the setting by using control up/down key respectively. All changed data will be stored into the EEPROM after returning to the service main menu via the OK key.

The initial default value for all setting is 37.

The factory settings of the colour temperatures are :

| | | | | |
|---|---|---|---|---|
| NORMAL | 10500K | R = 37 | G = 37 | B = 39 |
| DELTA WARM | 8200K | R = 0 | G = 254 | B = 249 |
| DELTA COOL | 14000K | R = 0 | G = 1 | B = 3 |

DELTA COOL TEMPERATURE SUB MENU

| | |
|---|---|
| • DELTA COOL RED | 0 |
| • DELTA COOL GREEN | 1 |
| • DELTA COOL BLUE | 3 |

DELTA WARM TEMPERATURE SUB MENU

| | |
|---|---|
| • DELTA WARM RED | 0 |
| • DELTA WARM GREEN | 254 |
| • DELTA WARM BLUE | 249 |

### *5.6.4 GEOMETRY*

The geometry menu contains the following information :

| | |
|---|---|
| HSH | Horizontal shift |
| VSL | Vertical slope |
| VAM | Vertical amplitude |
| VSH | Vertical shift |
| VX | Vertical Zoom |
| VSC | Vertical Scroll |
| EW | E-W amplitude |
| PW | E-W parabola/width |
| CP | E-W cornerparabola |
| TC | E-W trapezium |
| SC | S-Correction |
| SBL | Service blanking |
| H60 | Delta HSH for 60 Hz |
| V60 | Delta VAM for 60 Hz |

| | S |
|---|---|
| HSH | 32 |
| VSL | 32 |
| VAM | 32 |
| VSH | 34 |
| VX | 13 |
| VSC | 39 |
| EW | 54 |
| PW | 46 |
| CP | 39 |
| TC | 41 |
| SC | 52 |
| SBL | 0 |
| H60 | 10 |
| V60 | 10 |

Into the picture geometry menu, the first item will be highlighted and displayed. The value can be incremented or decremented by pressing the control right or left key. The rest of the parameters can be scrolled through by using the control up/down keys.

All changed data will be stored into the EEPROM after returning to the service main menu via the OK key

### *5.6.5 AUDIO*

The sound adjustments sub menu contains the following information :

| | |
|---|---|
| | S |
| AUDIO | |
| AUTO | > |
| ST-NT | 7 |
| SAP-NT | 7 |
| LA | 7 |
| WIDEB | 31 |
| SPECT | 31 |

The TDA9852 sub menu is only available if the BTSC sound IC is present. The settings can be changed by first highlighted the respective item using the control up/down keys and then increment or decrement the value by using the control right or left keys. The default value shown in the diagram are the normal values. For service purposes the normal values can be used

NOTE: The value should not change unless it is absolutely necessary !!!!

## 5.7 Dealer remote used as a Dealer Service Tool (DST)

With the DST, under mentioned extra service features can be executed.

The main features are :

- Direct entering SDM via the "DEFAULT" button on the DST.
- Direct entering SAM via the "ALIGN" button on the DST.
- Read the error buffer even if the OSD is not working at all. This is done via the blinking LED procedure

REMARKS:

- Entry of the SDM and SAM via the DST is possible in all states, except from stand-by.
- All software is suspended till the dealer remote mode is left.
- The service mode status is left if : the stand-by command is received.

## 5.8 Downloading of tuning data with the DST

Downloading of tuning data (programme number, frequency and system) via the DST is made possible. This downloading is ONLY possible in the version containing PLL tuning for Europe.

## 5.9 Blinking LED procedure

Via the DIAGNOSE 1 (for errorbuffer position 1) through the DIAGNOSE 5 (for error 5) commands of the DST, the error buffer can be made visible via the blinking LED. This is useful if the screen is not working properly. The method is to use the LED pulses with as many pulses as the error number, followed by a time period of 3 seconds in which the LED is off. E.g. error code 4 will result in four times the sequence LED on for 0.25 seconds / LED will be off for 0.25 seconds. After this sequence the LED will be off for 3 seconds.

## 5.10 Hotel-mode

The L7.3 chassis has one special mode, called the hotel mode. In the hotel mode the following occurs:

- Installation menu cannot be entered.
- When entering the hotel mode the maximum volume will be the current value.
- The set will always switch to a selectable channel when set is switched on.

Entering the hotel-mode :

- Select channel 38
- Push the menu button on the local keyboard ( vol. + and vol. - ) and the OSD-button of the RC simultaneously for 3 seconds; then you are in the hotel mode.

Leaving the hotel mode :

- Same as entering the hotel mode.

The OSD will display the hotel mode "on" or "off".

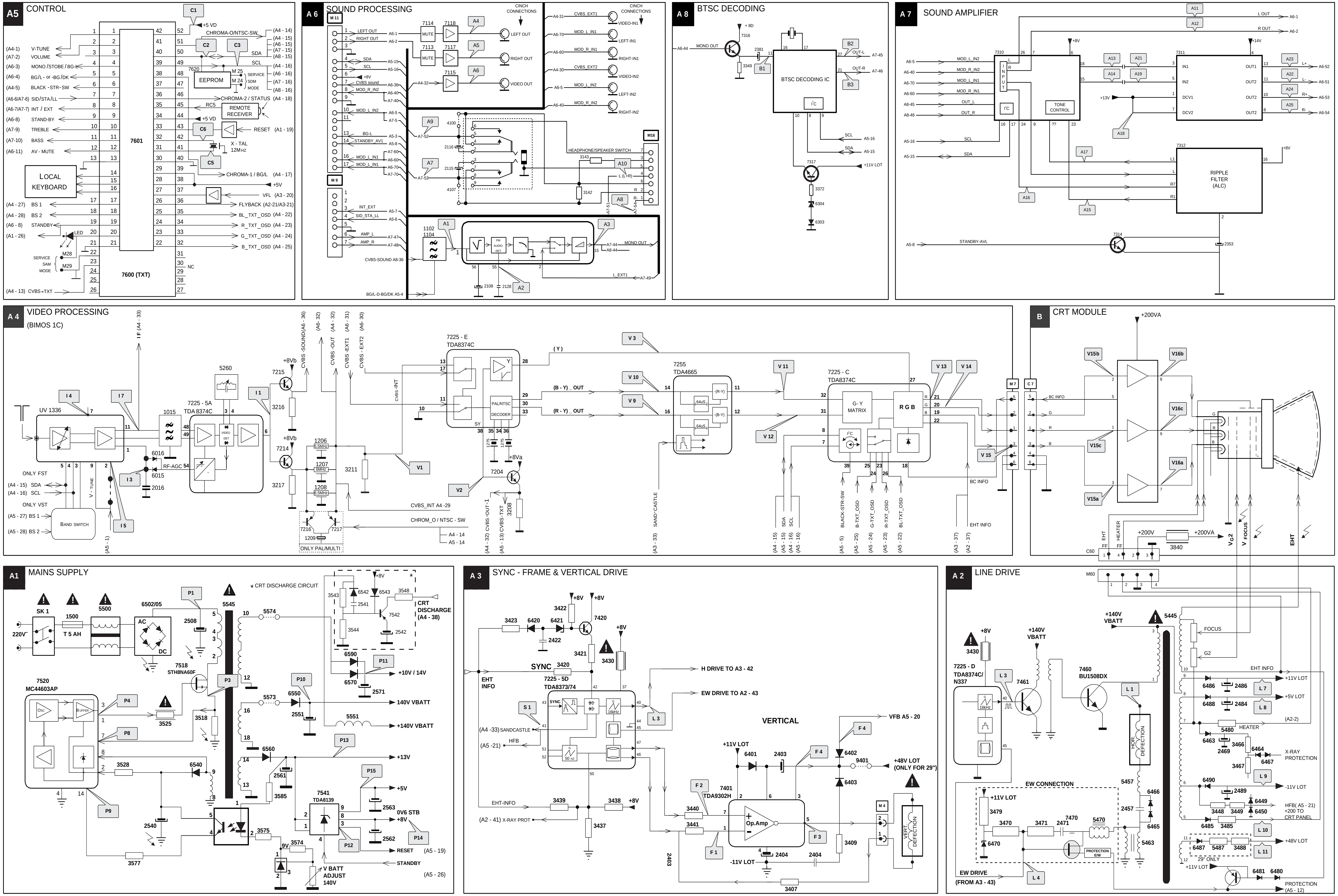
HOTEL MODE SUB MENU " ON "

| | |
|---|---|
| 38 | HOTEL ON |
| HOTEL CHANNEL | 38 |
| BLANK FROM | 6 |
| TO | 6 |

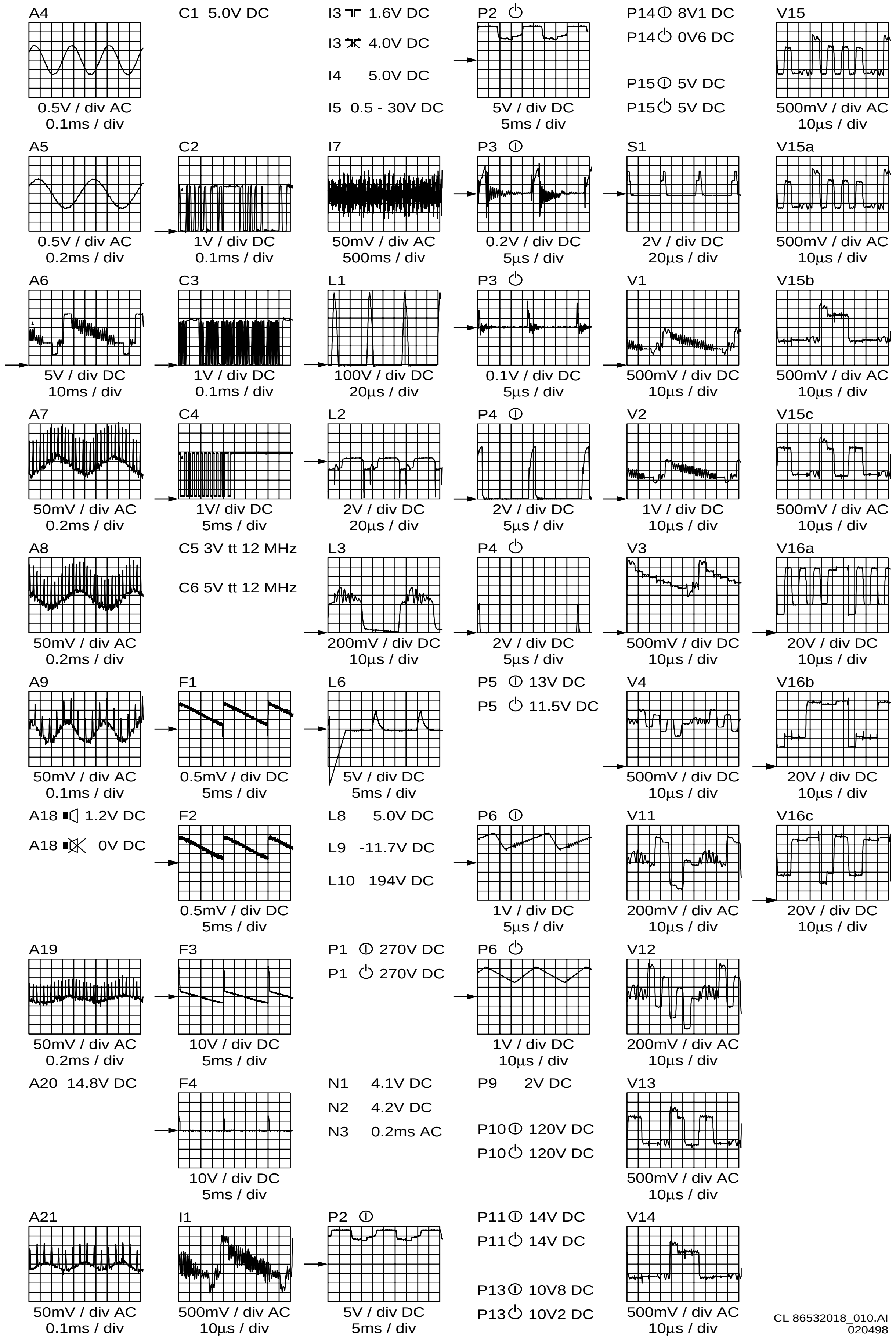
HOTEL MODE SUB MENU " OFF "

| | |
|---|---|
| 38 | HOTEL OFF |

# 6 Block diagram


A5 CONTROL
7601
7600 (TXT)
EEPROM
REMOTE RECEIVER
LOCAL KEYBOARD
X - TAL 12MHz
(A4-1) V-TUNE
(A7-2) VOLUME
(A6-3) MONO /STOBE / BG
(A6-4) BG/L - or -BG/DK
(A4-5) BLACK -STR-SW
(A6-6/A7-6) SID/STA/LL
(A6-7/A7-7) INT / EXT
(A6-8) STAND-BY
(A7-9) TREBLE
(A7-10) BASS
(A6-11) AV - MUTE
(A4 - 27) BS 1
(A4 - 28) BS 2
(A6 - 8) STANDBY
(A1 - 26)
LED
SERVICE SAM MODE
(A4 - 13) CVBS - TXT
CHROMA-O/NTSC-SW
SDA
SCL
CHROMA-2 / STATUS (A4 - 18)
RESET (A1 - 19)
+5 VD
CHROMA-1 / BG/L (A4 - 17)
+5V
VFL (A3 - 20)
FLYBACK (A2-21/A3-21)
BL_TXT_OSD (A4 - 22)
R_TXT_OSD (A4 - 23)
G_TXT_OSD (A4 - 24)
B_TXT_OSD (A4 - 25)
NC
A 6 SOUND PROCESSING
CINCH CONNECTIONS
LEFT OUT
RIGHT OUT
VIDEO OUT
MUTE
HEADPHONE/SPEAKER SWITCH
CVBS-SOUND A8-36
BG/L-D-BG/DK A5-4
MONO OUT
L_EXT1
A 8 BTSC DECODING
BTSC DECODING IC
MONO OUT
OUT-L
OUT-R
+11V LOT
A 7 SOUND AMPLIFIER
TONE CONTROL
RIPPLE FILTER (ALC)
L OUT
R OUT
STANDBY-AVL
A 4 VIDEO PROCESSING
(BIMOS 1C)
UV 1336
7225 - 5A TDA 8374C
7225 - E TDA8374C
PAL/NTSC DECODER
7255 TDA4665
7225 - C TDA8374C
G- Y MATRIX
R G B
(B - Y)_OUT
(R - Y)_OUT
(Y)
BAND SWITCH
ONLY FST
ONLY VST
RF-AGC
CVBS_INT A4 -29
CHROM_O / NTSC - SW
ONLY PAL/MULTI
SAND-CASTLE
BLACK-STR-SW
B-TXT_OSD
G-TXT_OSD
R-TXT_OSD
BL-TXT_OSD
BC INFO
EHT INFO
B CRT MODULE
+200VA
HEATER
EHT
V FOCUS
A1 MAINS SUPPLY
SK 1
220V~
T 5 AH
AC DC
7518 STH8NA6F
7520 MC44603AP
CRT DISCHARGE CIRCUIT
CRT DISCHARGE (A4 - 38)
+10V / 14V
140V VBATT
+140V VBATT
+13V
+5V
0V6 STB +8V
RESET (A5 - 19)
STANDBY (A5 - 26)
7541 TDA8139
V BATT ADJUST 140V
A 3 SYNC - FRAME & VERTICAL DRIVE
SYNC
7225 - 5D TDA8373/74
EHT INFO
H DRIVE TO A3 - 42
EW DRIVE TO A2 - 43
VERTICAL
VFB A5 - 20
+11V LOT
7401 TDA9302H
Op.Amp
+48V LOT (ONLY FOR 29")
-11V LOT
VERT DEFLECTION
(A4 -33) SANDCASTLE
(A5 -21) HFB
EHT-INFO
(A2 - 41) X-RAY PROT
A 2 LINE DRIVE
7225 - D TDA8374C/ N337
7461
7460 BU1508DX
+140V VBATT
HOR DEFLECTION
EW CONNECTION
PROTECTION E/W
EW DRIVE (FROM A3 - 43)
FOCUS
G2
EHT INFO
+11V LOT
+5V LOT
HEATER
X-RAY PROTECTION
-11V LOT
HFB( A5 - 21) +200 TO CRT PANEL
+48V LOT
29" ONLY
PROTECTION (A5 - 12)

# 6 Block diagram



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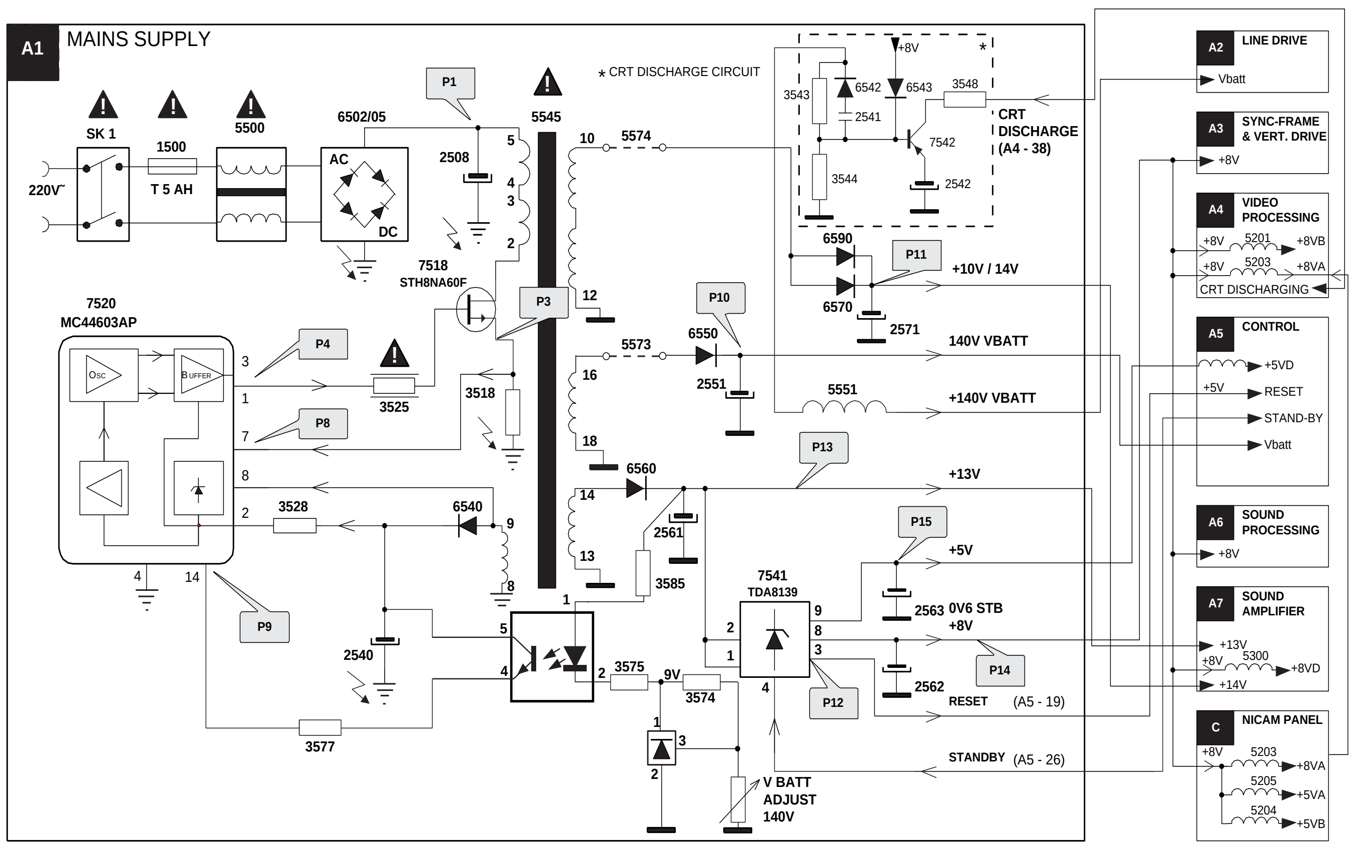
A1
MAINS SUPPLY
* CRT DISCHARGE CIRCUIT
SK 1
1500
T 5 AH
220V~
5500
6502/05
AC
DC
2508
P1
5545
5574
7518
STH8NA60F
7520
MC44603AP
OSC
BUFFER
P3
P4
P8
P9
3525
3518
3528
6540
2540
3577
CRT DISCHARGE (A4 - 38)
3543
6542
6543
3548
2541
7542
3544
2542
6590
P11
+10V / 14V
6570
2571
P10
6550
5573
2551
140V VBATT
5551
+140V VBATT
P13
6560
+13V
2561
P15
+5V
3585
7541
TDA8139
2563
0V6 STB
+8V
P14
2562
P12
3575
9V
3574
RESET (A5 - 19)
STANDBY (A5 - 26)
V BATT ADJUST 140V
A2 LINE DRIVE
Vbatt
A3 SYNC-FRAME & VERT. DRIVE
+8V
A4 VIDEO PROCESSING
5201
+8VB
5203
+8VA
CRT DISCHARGING
A5 CONTROL
+5VD
+5V
RESET
STAND-BY
Vbatt
A6 SOUND PROCESSING
+8V
A7 SOUND AMPLIFIER
+13V
+8V
5300
+8VD
+14V
C NICAM PANEL
+8V
5203
+8VA
5205
+5VA
5204
+5VB

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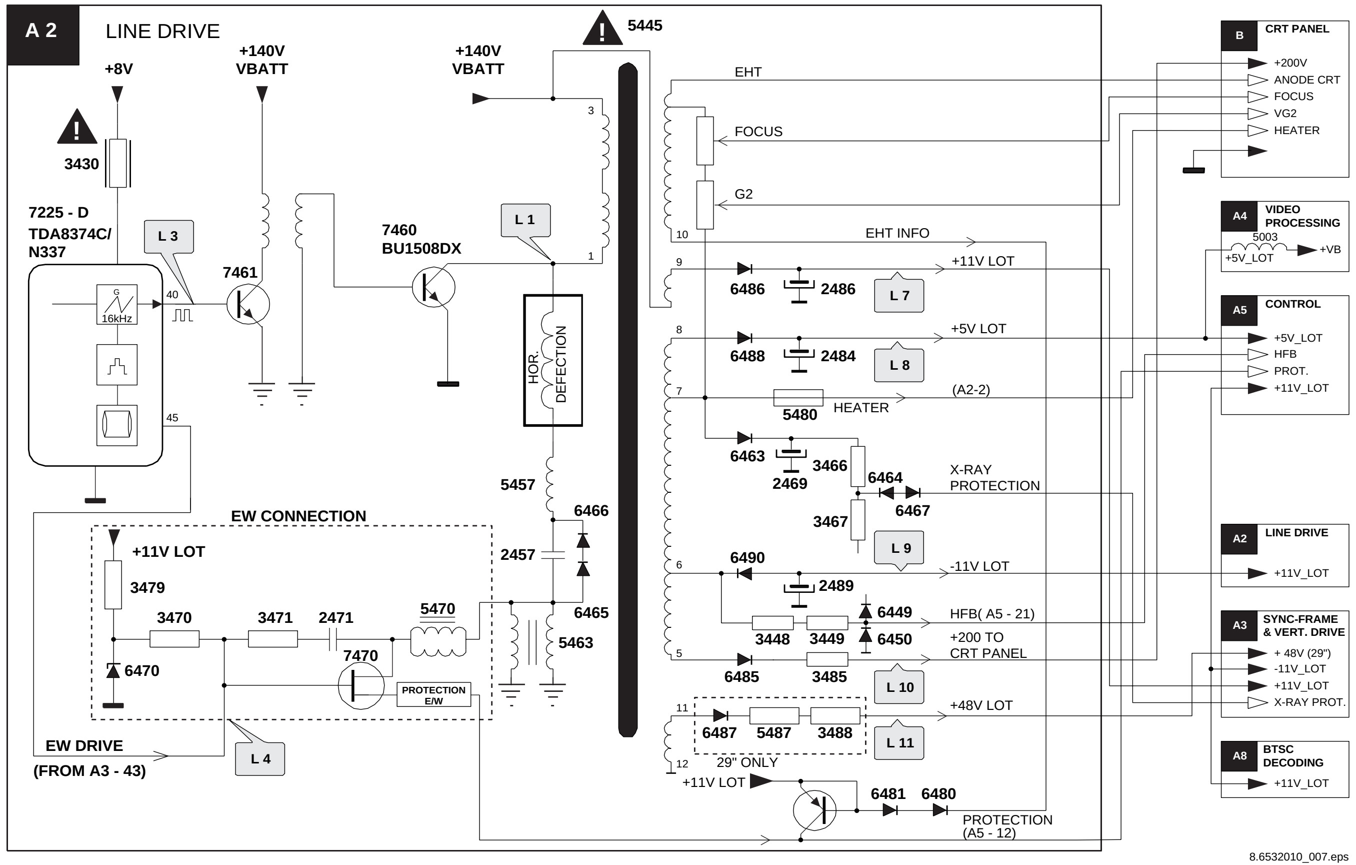
A 2
LINE DRIVE
+8V
+140V VBATT
+140V VBATT
5445
3430
7225 - D
TDA8374C/ N337
L 3
16kHz
40
45
7461
7460
BU1508DX
L 1
HOR. DEFECTION
EHT
FOCUS
G2
EHT INFO
+11V LOT
6486
2486
L 7
+5V LOT
6488
2484
L 8
5480
HEATER
(A2-2)
6463
2469
3466
6464
X-RAY PROTECTION
6467
3467
L 9
6490
2489
-11V LOT
6449
HFB( A5 - 21)
3448
3449
6450
+200 TO CRT PANEL
6485
3485
L 10
6487
5487
3488
L 11
+48V LOT
29" ONLY
+11V LOT
6481
6480
PROTECTION (A5 - 12)
5457
6466
2457
6465
5463
EW CONNECTION
+11V LOT
3479
3470
3471
2471
5470
7470
6470
PROTECTION E/W
EW DRIVE (FROM A3 - 43)
L 4
B CRT PANEL
+200V
ANODE CRT
FOCUS
VG2
HEATER
A4 VIDEO PROCESSING
5003
+5V_LOT
+VB
A5 CONTROL
+5V_LOT
HFB
PROT.
+11V_LOT
A2 LINE DRIVE
+11V_LOT
A3 SYNC-FRAME & VERT. DRIVE
+ 48V (29")
-11V_LOT
+11V_LOT
X-RAY PROT.
A8 BTSC DECODING
+11V_LOT

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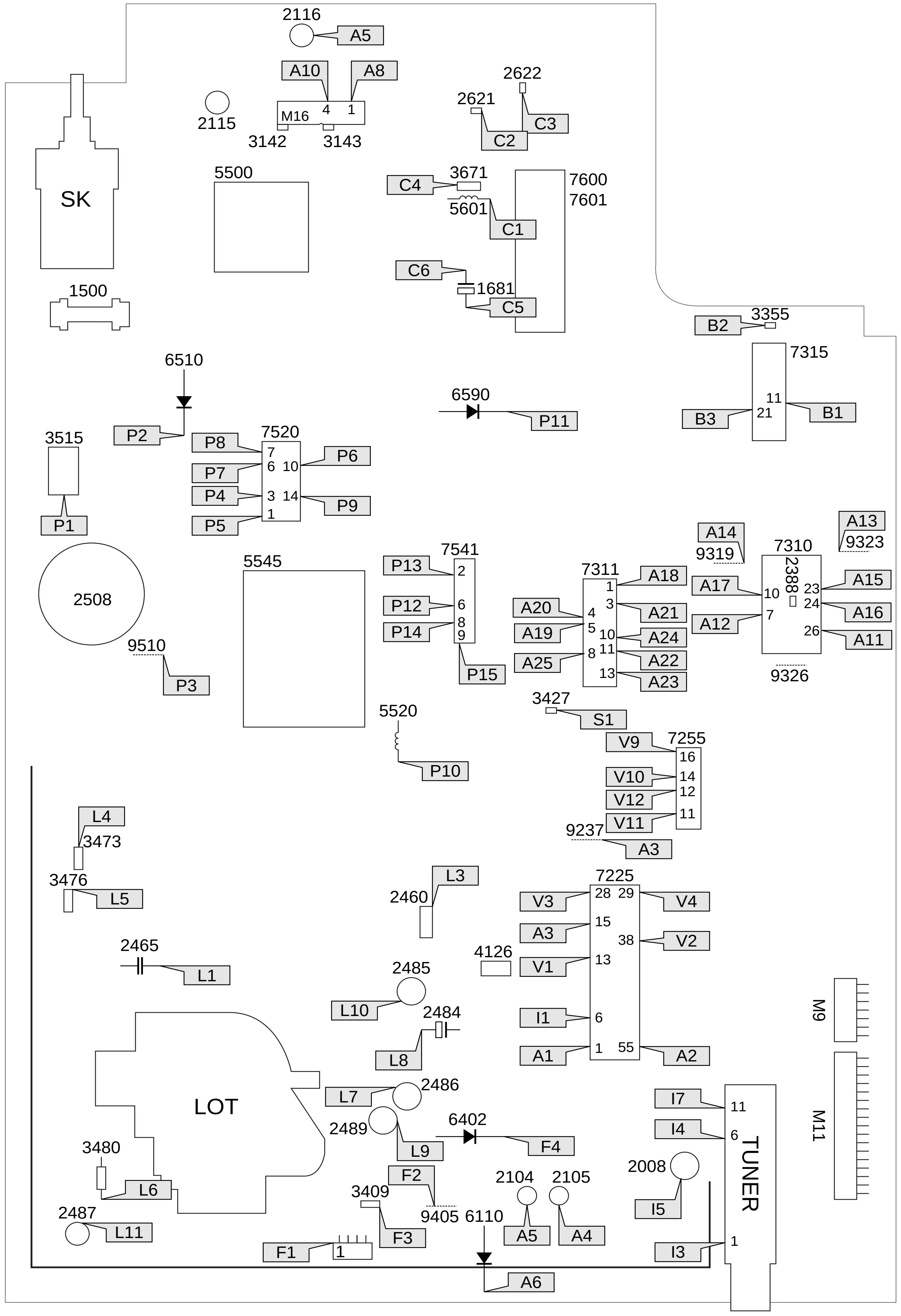
# 6 Block diagram


2116
A5
A10
A8
M16
4
1
2115
3142
3143
2622
2621
C3
C2
SK
5500
C4
3671
5601
C1
7600
7601
C6
1681
C5
1500
B2
3355
7315
6510
6590
P11
11
21
B3
B1
3515
P2
7520
P8
7
6
10
P6
P7
P4
3
14
P9
P5
1
P1
A14
A13
9323
9319
7310
2388
P13
7541
2
7311
A18
A17
10
23
A15
2508
5545
P12
6
A20
1
3
A21
24
A16
P14
8
9
A19
4
5
10
11
A24
A12
7
26
A11
9510
A25
8
A22
P3
P15
13
A23
9326
5520
3427
S1
V9
7255
P10
16
V10
14
V12
12
V11
11
L4
9237
A3
3473
3476
L5
L3
2460
7225
V3
28
29
V4
15
A3
38
V2
2465
4126
V1
13
L1
2485
M9
L10
2484
I1
6
L8
A1
1
55
A2
L7
2486
LOT
I7
11
M11
2489
6402
I4
6
L9
F4
TUNER
3480
F2
2008
L6
3409
2104
2105
2487
9405
6110
I5
L11
F3
A5
A4
F1
1
I3
1
A6

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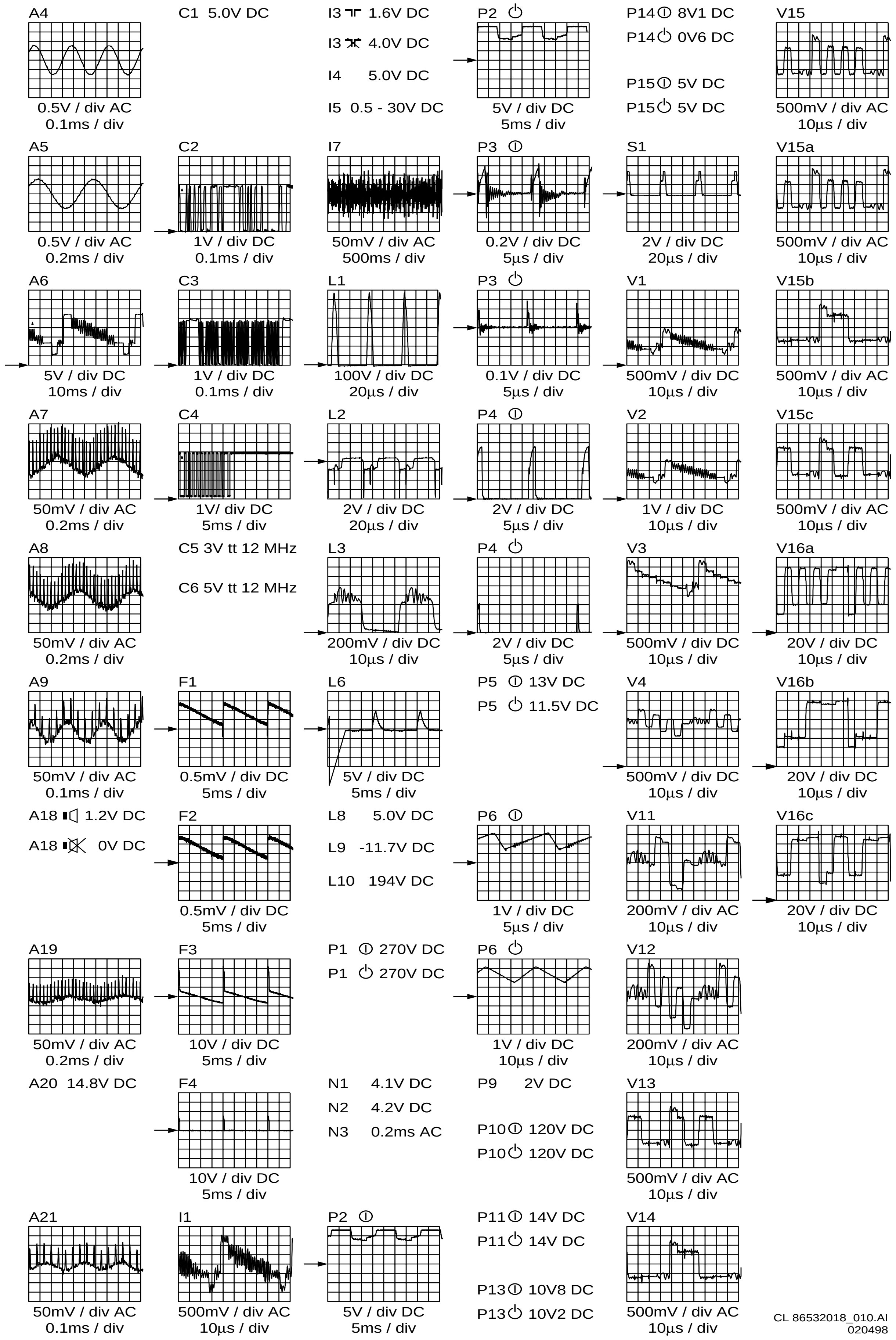

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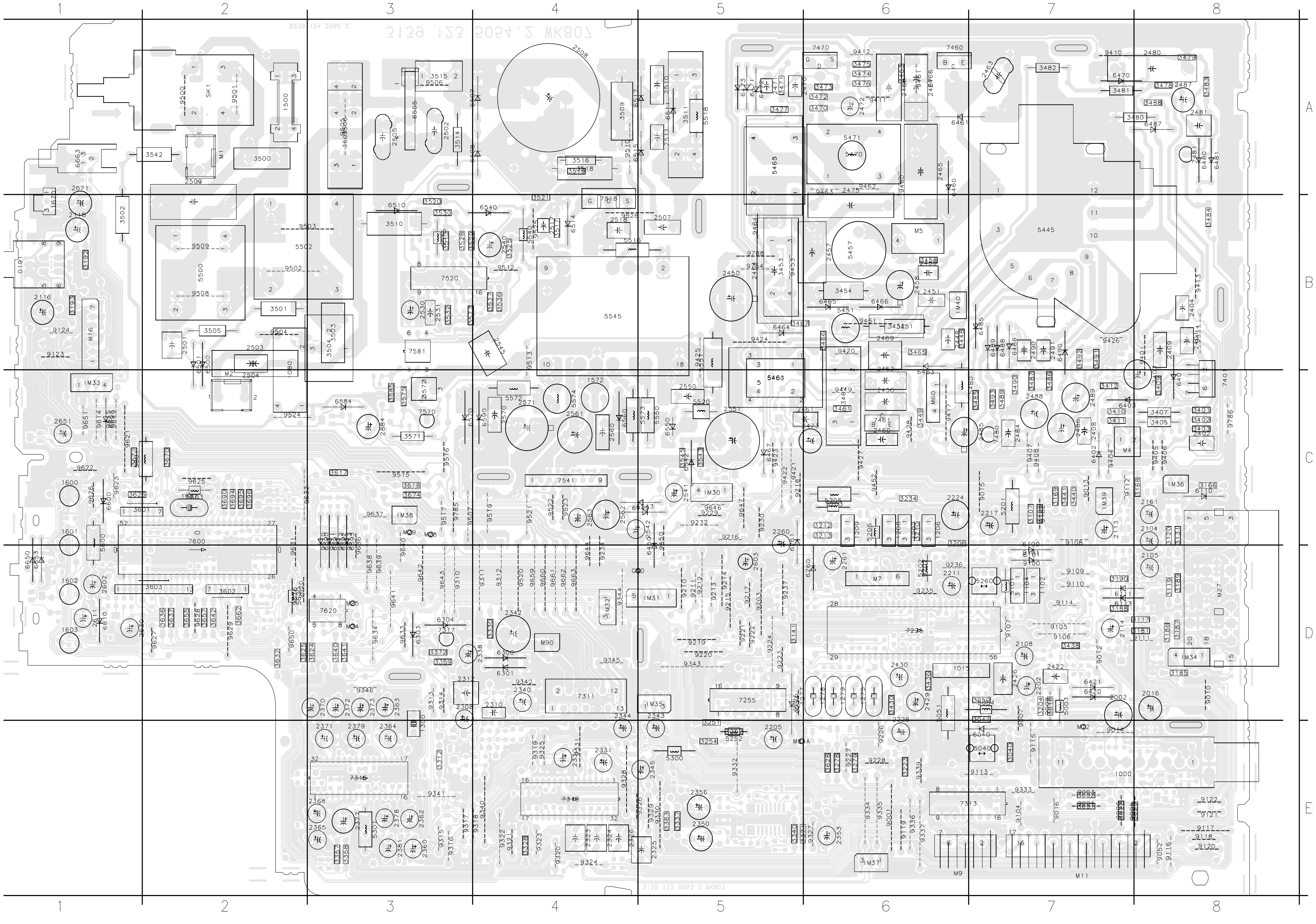
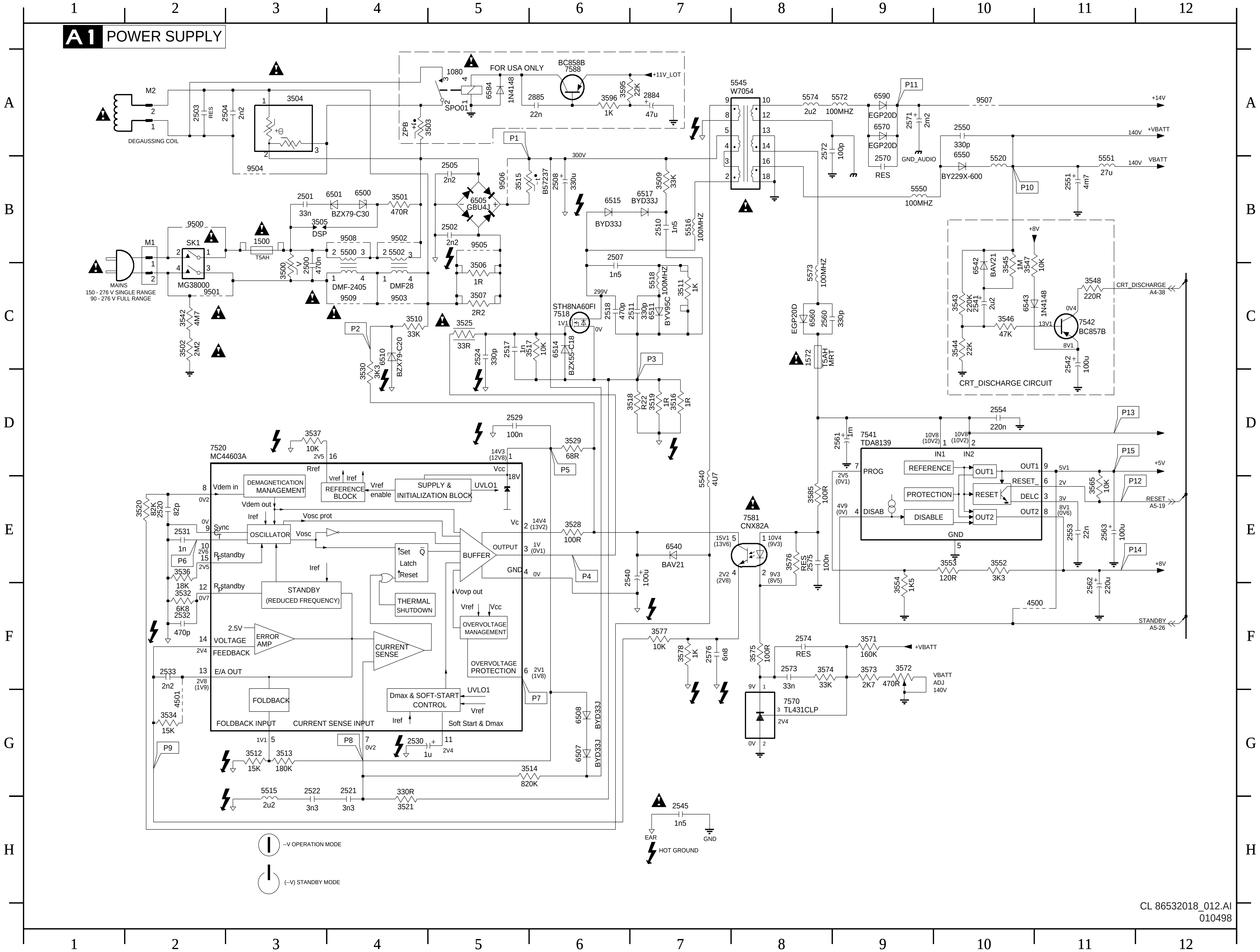


| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| M1 | A2 | 2510 | A5 | 3517 | B4 | 6584 | C3 | 9411 | A6 |
| M2 | C2 | 2511 | A5 | 3518 | A4 | 6590 | C4 | 9412 | A6 |
| M4 | C7 | 2517 | B4 | 3519 | A4 | 6600 | C1 | 9413 | B8 |
| M5 | B6 | 2518 | B4 | 3520 | B3 | 6610 | D1 | 9414 | B8 |
| M7 | D6 | 2530 | B3 | 3521 | B4 | 6650 | D1 | 9417 | C6 |
| M9 | E6 | 2531 | B3 | 3525 | B4 | 6653 | D1 | 9419 | C6 |
| GND | D4 | 2540 | B4 | 3528 | B3 | 6661 | C1 | 9420 | B6 |
| M11 | E7 | 2541 | C5 | 3529 | B4 | 6663 | A1 | 9421 | C5 |
| M12 | D7 | 2542 | C4 | 3530 | B3 | 6690 | C3 | 9422 | C5 |
| M16 | B1 | 2545 | B4 | 3532 | B3 | 6691 | C3 | 9423 | C5 |
| M24 | D3 | 2550 | C5 | 3536 | B4 | 6692 | C3 | 9424 | B5 |
| M25 | D3 | 2551 | C5 | 3537 | B4 | 6693 | C3 | 9425 | B5 |
| M27 | D8 | 2560 | C4 | 3542 | A2 | 7225 | D6 | 9426 | B7 |
| M28 | C3 | 2561 | C4 | 3543 | C5 | 7255 | E5 | 9427 | C6 |
| M29 | C3 | 2562 | C4 | 3545 | C5 | 7310 | E4 | 9428 | C6 |
| M60 | C6 | 2563 | C4 | 3571 | C3 | 7311 | D4 | 9450 | C5 |
| M90 | D4 | 2570 | C4 | 3572 | C3 | 7313 | E6 | 9451 | B6 |
| SK1 | A2 | 2571 | C4 | 3575 | C3 | 7315 | E3 | 9452 | C6 |
| 0191 | B1 | 2602 | D1 | 3577 | B4 | 7317 | D3 | 9453 | B5 |
| 1000 | E7 | 2603 | D5 | 3585 | C3 | 7401 | B8 | 9460 | A6 |
| 1015 | D6 | 2611 | D1 | 3601 | C2 | 7460 | A6 | 9461 | A6 |
| 1080 | B2 | 2630 | D1 | 3602 | D2 | 7461 | C6 | 9462 | A6 |
| 1102 | D7 | 2651 | C1 | 3603 | D2 | 7470 | A5 | 9463 | B6 |
| 1104 | D7 | 2671 | A1 | 3617 | C3 | 7480 | C7 | 9464 | B5 |
| 1206 | C6 | 2884 | C3 | 3618 | C3 | 7481 | A8 | 9500 | A2 |
| 1207 | C6 | 3001 | E7 | 3624 | D3 | 7518 | B4 | 9501 | A2 |
| 1208 | C6 | 3002 | E7 | 3625 | D2 | 7520 | B3 | 9502 | B2 |
| 1209 | C6 | 3016 | E7 | 3626 | C1 | 7541 | C4 | 9503 | B2 |
| 1275 | D6 | 3020 | E8 | 3628 | E6 | 7570 | C3 | 9504 | B2 |
| 1277 | D6 | 3022 | E7 | 3632 | D2 | 7581 | B3 | 9505 | A3 |
| 1278 | D6 | 3040 | E7 | 3636 | D2 | 7600 | C1 | 9506 | A3 |
| 1279 | D6 | 3041 | E7 | 3637 | D2 | 7620 | D3 | 9507 | C3 |
| 1300 | E3 | 3050 | D7 | 3640 | D3 | 9001 | E6 | 9508 | B2 |
| 1500 | A2 | 3106 | C7 | 3641 | D3 | 9003 | E7 | 9509 | B2 |
| 1572 | C4 | 3107 | C7 | 3642 | D2 | 9004 | E7 | 9510 | A4 |
| 1600 | C1 | 3117 | D8 | 3655 | D2 | 9005 | E8 | 9512 | B4 |
| 1601 | D1 | 3119 | D8 | 3657 | D2 | 9006 | E7 | 9513 | B4 |
| 1602 | D1 | 3120 | C8 | 3662 | D2 | 9007 | D7 | 9515 | C3 |
| 1603 | D1 | 3131 | C8 | 3670 | C2 | 9008 | E7 | 9516 | C3 |
| 1670 | B1 | 3141 | D5 | 3671 | C1 | 9010 | D8 | 9517 | C3 |
| 1681 | C2 | 3166 | C8 | 3674 | C3 | 9012 | D7 | 9519 | C4 |
| 2002 | D7 | 3168 | C8 | 3690 | C2 | 9013 | C7 | 9520 | D4 |
| 2016 | D8 | 3169 | C7 | 3694 | C2 | 9014 | E7 | 9521 | C4 |
| 2104 | C8 | 3181 | D8 | 3695 | C2 | 9015 | C7 | 9522 | C4 |
| 2105 | D8 | 3185 | D8 | 3696 | C2 | 9016 | E7 | 9523 | C4 |
| 2108 | D7 | 3186 | D8 | 5003 | D7 | 9052 | E8 | 9524 | C2 |
| 2113 | C7 | 3187 | D8 | 5040 | E7 | 9100 | D7 | 9525 | B4 |
| 2114 | D7 | 3188 | D7 | 5051 | D6 | 9101 | D7 | 9526 | B4 |
| 2115 | B1 | 3189 | D8 | 5054 | D7 | 9102 | C7 | 9610 | C3 |
| 2116 | B1 | 3190 | D7 | 5101 | D7 | 9104 | E7 | 9611 | C3 |
| 2161 | C8 | 3192 | B1 | 5201 | C7 | 9105 | D7 | 9612 | C3 |
| 2202 | D7 | 3193 | B1 | 5202 | D6 | 9106 | D7 | 9613 | C3 |
| 2205 | E5 | 3204 | D7 | 5203 | C6 | 9107 | D7 | 9614 | C1 |
| 2211 | D6 | 3206 | D6 | 5205 | C6 | 9108 | C7 | 9615 | C1 |
| 2217 | C7 | 3210 | D6 | 5206 | C6 | 9109 | D7 | 9616 | D2 |
| 2224 | C6 | 3212 | C6 | 5252 | E5 | 9110 | D7 | 9620 | D2 |
| 2226 | D6 | 3213 | C6 | 5260 | D7 | 9111 | D8 | 9621 | C1 |
| 2260 | C5 | 3223 | E6 | 5300 | E5 | 9112 | C7 | 9622 | C1 |
| 2261 | D6 | 3234 | C6 | 5301 | E3 | 9113 | E7 | 9623 | C1 |
| 2308 | E3 | 3251 | D5 | 5445 | A7 | 9114 | D7 | 9625 | C2 |
| 2310 | D4 | 3252 | E5 | 5451 | B6 | 9115 | E7 | 9626 | C1 |
| 2312 | D3 | 3254 | E5 | 5457 | B6 | 9116 | E8 | 9627 | D2 |
| 2323 | E4 | 3278 | E6 | 5460 | C5 | 9117 | E8 | 9628 | D2 |
| 2324 | E4 | 3279 | E6 | 5461 | C5 | 9118 | E8 | 9629 | D2 |
| 2325 | E5 | 3312 | E3 | 5463 | A5 | 9119 | E6 | 9631 | D2 |
| 2326 | E4 | 3328 | E4 | 5465 | A5 | 9120 | E8 | 9632 | C3 |
| 2330 | E4 | 3330 | D4 | 5470 | A6 | 9121 | E8 | 9633 | D3 |
| 2331 | E4 | 3337 | E5 | 5471 | A6 | 9122 | E8 | 9634 | D3 |
| 2338 | D4 | 3340 | E5 | 5480 | C7 | 9123 | B1 | 9636 | D3 |
| 2340 | D4 | 3357 | E3 | 5500 | B2 | 9124 | B1 | 9637 | C3 |
| 2342 | D4 | 3358 | E3 | 5502 | A2 | 9202 | D6 | 9638 | D3 |
| 2343 | E5 | 3359 | D3 | 5515 | B3 | 9203 | D5 | 9639 | D3 |
| 2344 | E4 | 3363 | E5 | 5516 | B4 | 9210 | D5 | 9640 | D3 |
| 2345 | E5 | 3371 | E5 | 5518 | A5 | 9211 | D5 | 9641 | D3 |
| 2350 | E5 | 3372 | D3 | 5520 | C5 | 9212 | D5 | 9642 | D3 |
| 2353 | E6 | 3401 | C8 | 5540 | B4 | 9213 | D5 | 9643 | D3 |
| 2356 | E5 | 3402 | C8 | 5545 | C5 | 9214 | D5 | 9644 | D4 |
| 2360 | E3 | 3403 | C8 | 5550 | C5 | 9215 | D5 | 9646 | C5 |
| 2362 | E3 | 3405 | C8 | 5551 | B5 | 9216 | C5 | 9647 | C5 |
| 2363 | D3 | 3407 | C8 | 5572 | C4 | 9217 | D5 | 9649 | C1 |
| 2364 | E3 | 3409 | C8 | 5573 | C4 | 9218 | C5 | 9650 | D2 |
| 2365 | E3 | 3410 | C7 | 5574 | C4 | 9219 | D5 | 9651 | C1 |
| 2368 | E3 | 3411 | C7 | 5600 | C1 | 9220 | D5 | 9659 | D4 |
| 2370 | D3 | 3412 | C7 | 5601 | C2 | 9221 | D5 | 9660 | D4 |
| 2371 | E3 | 3430 | D6 | 5603 | C2 | 9222 | D5 | 9661 | D4 |
| 2372 | D3 | 3436 | D6 | 5620 | D2 | 9223 | D5 | 9662 | D4 |
| 2373 | D3 | 3438 | D7 | 6040 | E7 | 9224 | D5 | 9663 | D4 |
| 2377 | E3 | 3440 | C7 | 6100 | D7 | 9225 | D5 | 9754 | B5 |
| 2378 | E3 | 3441 | C7 | 6101 | D7 | 9226 | E6 | 9785 | C3 |
| 2379 | E3 | 3448 | B6 | 6110 | C8 | 9227 | E6 | 9786 | C8 |
| 2381 | E3 | 3449 | C6 | 6111 | D8 | 9228 | E6 | 9788 | B5 |
| 2401 | B8 | 3451 | B6 | 6113 | D8 | 9229 | C5 | IM30 | C5 |
| 2402 | C8 | 3452 | B6 | 6254 | E5 | 9230 | C5 | IM31 | D5 |
| 2403 | C7 | 3453 | B5 | 6260 | D6 | 9232 | C5 | IM32 | D4 |
| 2404 | B8 | 3454 | B6 | 6261 | C5 | 9234 | D4 | IM33 | C1 |
| 2408 | C7 | 3458 | B6 | 6300 | D4 | 9235 | D6 | IM34 | D8 |
| 2409 | B8 | 3461 | C6 | 6301 | D4 | 9236 | D6 | IM35 | D5 |
| 2422 | D7 | 3462 | C6 | 6303 | D3 | 9237 | D5 | IM36 | C8 |
| 2426 | D7 | 3463 | A6 | 6304 | D3 | 9310 | D3 | IM37 | E6 |
| 2429 | D6 | 3465 | B6 | 6401 | B8 | 9311 | D4 | IM38 | C3 |
| 2430 | D6 | 3466 | B6 | 6402 | C7 | 9312 | D4 | IM39 | C7 |
| 2448 | B6 | 3467 | B6 | 6403 | C7 | 9313 | D3 | IM40 | B6 |
| 2450 | B5 | 3470 | A6 | 6420 | D7 | 9314 | D3 | M84A | E5 |
| 2451 | B6 | 3471 | A5 | 6421 | D7 | 9315 | E3 | | |
| 2456 | C6 | 3472 | A6 | 6449 | C4 | 9316 | E3 | | |
| 2457 | B6 | 3473 | A6 | 6450 | D5 | 9317 | E3 | | |
| 2458 | B6 | 3474 | A6 | 6460 | B6 | 9318 | E4 | | |
| 2459 | B6 | 3475 | A6 | 6461 | A6 | 9319 | E4 | | |
| 2460 | C6 | 3476 | A6 | 6463 | B6 | 9320 | E4 | | |
| 2461 | C5 | 3477 | A5 | 6464 | B5 | 9321 | E4 | | |
| 2462 | C6 | 3478 | A8 | 6465 | B6 | 9322 | E4 | | |
| 2463 | A7 | 3479 | A8 | 6466 | B6 | 9323 | E4 | | |
| 2464 | B5 | 3480 | A7 | 6467 | C5 | 9324 | E4 | | |
| 2465 | A6 | 3481 | A7 | 6470 | A7 | 9325 | E4 | | |
| 2466 | A6 | 3482 | A7 | 6471 | A5 | 9326 | E5 | | |
| 2467 | A6 | 3483 | A8 | 6472 | A5 | 9327 | E6 | | |
| 2468 | A6 | 3484 | B8 | 6473 | A5 | 9328 | E4 | | |
| 2469 | B6 | 3485 | C7 | 6480 | A8 | 9329 | E5 | | |
| 2470 | A5 | 3486 | C7 | 6481 | A8 | 9330 | E5 | | |
| 2471 | A5 | 3487 | C7 | 6485 | B7 | 9331 | E4 | | |
| 2472 | A6 | 3488 | A8 | 6486 | B7 | 9332 | E5 | | |
| 2473 | C6 | 3489 | C7 | 6487 | A8 | 9333 | E7 | | |
| 2475 | B6 | 3490 | C7 | 6488 | B7 | 9334 | E6 | | |
| 2480 | A7 | 3491 | B7 | 6489 | B7 | 9335 | E6 | | |
| 2481 | A8 | 3492 | B7 | 6490 | B7 | 9336 | E6 | | |
| 2484 | C7 | 3493 | C7 | 6500 | B2 | 9337 | E6 | | |
| 2485 | C7 | 3500 | A2 | 6501 | C2 | 9339 | E6 | | |
| 2486 | C7 | 3501 | B2 | 6505 | A3 | 9340 | E4 | | |
| 2487 | A8 | 3502 | B1 | 6507 | A3 | 9341 | E3 | | |
| 2488 | C7 | 3503 | B3 | 6508 | A4 | 9342 | D4 | | |
| 2489 | C7 | 3504 | B3 | 6510 | B3 | 9343 | D5 | | |
| 2490 | B7 | 3505 | B2 | 6511 | A5 | 9344 | D4 | | |
| 2491 | B7 | 3506 | A3 | 6514 | B4 | 9345 | D4 | | |
| 2500 | A2 | 3507 | A3 | 6515 | A4 | 9346 | D3 | | |
| 2501 | B2 | 3509 | A4 | 6517 | A5 | 9401 | B8 | | |
| 2502 | A3 | 3510 | B3 | 6540 | B4 | 9404 | C7 | | |
| 2503 | B2 | 3511 | A5 | 6542 | C5 | 9405 | C8 | | |
| 2504 | B2 | 3513 | B3 | 6543 | C5 | 9406 | C8 | | |
| 2505 | A3 | 3514 | A3 | 6550 | C5 | 9407 | C7 | | |
| 2507 | B5 | 3515 | A3 | 6560 | C4 | 9408 | C7 | | |
| 2508 | A4 | 3516 | A4 | 6570 | C3 | 9410 | A7 | | |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1 2 3 4 5 6 7 8 9 10 11 12
A B C D E F G H
M2
DEGAUSSING COIL
M1
SK1
MAINS
150 - 276 V SINGLE RANGE
90 - 276 V FULL RANGE
MG38000
1500
T5AH
3504
9504
9500
9501
2503 RES
2504 2n2
3542 4M7
3502 2M2
3500 2M2
2500 470n
DMF-2405
DMF28
5500
5502
9508
9502
9509
9503
3505 DSP
2501 33n
6501
6500
BZX79-C30
3501 470R
1080
FOR USA ONLY
SPO01
ZPB
3503
6584
1N4148
2885 22n
BC858B 7588
3596 1K
3595 22K
2884 47u
+11V_LOT
2505 2n2
6505 GBU4J
2502 2n2
9505
3506 1R
3507 2R2
9506
3515
B57237
2508
330u
300V
6515 BYD33J
6517 BYD33J
3509 33K
2510 1n5
5516 100MHZ
2507 1n5
5518 100MHZ
3511 1K
299V
STH8NA60FI 7518
2518 470p
2511 330p
6511 BYV95C
3510 33K
3525 33R
2524 330p
2517 1n
3517 10K
6514 BZX55-C18
6510 BZX79-C20
3530 3K3
P1 P2 P3 P4 P5 P6 P7 P8 P9 P10 P11 P12 P13 P14 P15
3518 R22
3519 1R
3516 1R
2529 100n
3529 68R
3537 10K
7520 MC44603A
DEMAGNETICATION MANAGEMENT
REFERENCE BLOCK
SUPPLY & INITIALIZATION BLOCK
UVLO1
OSCILLATOR
STANDBY (REDUCED FREQUENCY)
BUFFER
THERMAL SHUTDOWN
OVERVOLTAGE MANAGEMENT
ERROR AMP
CURRENT SENSE
OVERVOLTAGE PROTECTION
FOLDBACK
Dmax & SOFT-START CONTROL
FOLDBACK INPUT
CURRENT SENSE INPUT
Soft Start & Dmax
VOLTAGE FEEDBACK
E/A OUT
Vdem in
Sync
Rstandby
Vosc prot
Vcc
Vc
OUTPUT
GND
3520 82K
2520 82p
2531 1n
3536 18K
3532 6K8
2532 470p
2533 2n2
4501
3534 15K
3512 15K
3513 180K
2530 1u
3514 820K
5515 2u2
2522 3n3
2521 3n3
3521 330R
3528 100R
2540 100u
6540 BAV21
5540 4U7
3577 10K
3578 1K
2576 6n8
6508 BYD33J
6507 BYD33J
2545 1n5
EAR
GND
HOT GROUND
–V OPERATION MODE
(–V) STANDBY MODE
5545 W7054
5574 2u2
5572 100MHZ
6590 EGP20D
6570 EGP20D
2570 RES
2571 2m2
GND_AUDIO
2572 100p
2550 330p
6550 BY229X-600
5520
5551 27u
2551 4m7
5550 100MHZ
9507
+14V
+VBATT
VBATT
140V
5573 100MHZ
EGP20D
6560
2560 330p
1572 T5AH MRT
CRT_DISCHARGE CIRCUIT
CRT_DISCHARGE A4-38
6542 BAV21
3545 1M
3547 10K
3543 220K
2541 2u2
6543 1N4148
3546 47K
3544 22K
3548 220R
7542 BC857B
2542 100u
+8V
2554 220n
2561 1m
7541 TDA8139
REFERENCE
PROTECTION
DISABLE
OUT1
RESET
OUT2
RESET_
DELC
PROG
DISAB
IN1 IN2
3565 10K
+5V
RESET A5-19
2553 22n
2563 100u
3585 100R
3576 RES
2575 100n
7581 CNX82A
3553 120R
3552 3K3
3554 1K5
2562 220u
4500
STANDBY A5-26
3575 100R
2574 RES
3571 160K
2573 33n
3574 33K
3573 2K7
3572 470R
VBATT ADJ 140V
7570 TL431CLP

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010498

|  |  |
|---|---|
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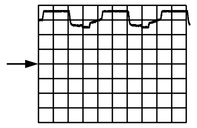
| M2 | A2 |
| SK1 | B2 |
| 1080 | A5 |
| 1500 | B3 |
| 1572 | C8 |
| 2500 | C3 |
| 2501 | B3 |
| 2502 | B5 |
| 2503 | A2 |
| 2504 | A3 |
| 2505 | B5 |
| 2507 | B6 |
| 2508 | B6 |
| 2510 | B7 |
| 2511 | C7 |
| 2517 | C5 |
| 2518 | C6 |
| 2520 | E2 |
| 2521 | G4 |
| 2522 | G3 |
| 2524 | C5 |
| 2529 | D5 |
| 2530 | G4 |
| 2531 | E2 |
| 2532 | F2 |
| 2533 | F2 |
| 2540 | E6 |
| 2541 | C10 |
| 2542 | C11 |
| 2545 | H7 |
| 2550 | A10 |
| 2551 | B11 |
| 2553 | E11 |
| 2554 | D10 |
| 2560 | C8 |
| 2561 | D9 |
| 2562 | F11 |
| 2563 | E11 |
| 2570 | B9 |
| 2571 | A9 |
| 2572 | A8 |
| 2573 | F8 |
| 2574 | F8 |
| 2575 | E8 |
| 2576 | F7 |
| 2884 | A7 |
| 2885 | A6 |
| 3500 | C3 |
| 3501 | B4 |
| 3502 | C2 |
| 3503 | A4 |
| 3504 | A3 |
| 3505 | B3 |
| 3506 | C5 |
| 3507 | C5 |
| 3509 | B7 |
| 3510 | C4 |
| 3511 | C7 |
| 3512 | G3 |
| 3513 | G3 |
| 3514 | G6 |
| 3515 | B5 |
| 3516 | D7 |
| 3517 | C6 |
| 3518 | D7 |
| 3519 | D7 |
| 3520 | E2 |
| 3521 | H4 |
| 3525 | C5 |
| 3528 | E6 |
| 3529 | D6 |
| 3530 | D4 |
| 3532 | F2 |
| 3534 | G2 |
| 3536 | E2 |
| 3537 | D3 |
| 3542 | C2 |
| 3543 | C10 |
| 3544 | C10 |
| 3545 | C10 |
| 3546 | C10 |
| 3547 | C10 |
| 3548 | C11 |
| 3552 | E10 |
| 3553 | E10 |
| 3554 | F9 |
| 3565 | E11 |
| 3571 | F9 |
| 3572 | F9 |
| 3573 | F9 |
| 3574 | F8 |
| 3575 | F8 |
| 3576 | E8 |
| 3577 | F7 |
| 3578 | F7 |
| 3585 | E8 |
| 3595 | A6 |
| 3596 | A6 |
| 4500 | F11 |
| 4501 | G2 |
| 5500 | B4 |
| 5502 | B4 |
| 5515 | G3 |
| 5516 | B7 |
| 5518 | C7 |
| 5520 | B10 |
| 5540 | E7 |
| 5545 | A7 |
| 5550 | B9 |
| 5551 | B11 |
| 5572 | A9 |
| 5573 | C8 |
| 5574 | A8 |
| 6500 | B4 |
| 6501 | B4 |
| 6505 | B5 |
| 6507 | G6 |
| 6508 | G6 |
| 6510 | C4 |
| 6511 | C7 |
| 6514 | C6 |
| 6515 | B6 |
| 6517 | B7 |
| 6540 | E7 |
| 6542 | C10 |
| 6543 | C10 |
| 6550 | B10 |
| 6560 | C8 |
| 6570 | A9 |
| 6584 | A5 |
| 6590 | A9 |
| 7518 | C6 |
| 7520 | D2 |
| 7541 | D9 |
| 7542 | C11 |
| 7570 | G8 |
| 7581 | E8 |
| 7588 | A6 |
| 9500 | B2 |
| 9501 | C2 |
| 9502 | B4 |
| 9503 | C4 |
| 9504 | B3 |
| 9505 | B5 |
| 9506 | B5 |
| 9507 | A10 |
| 9508 | B4 |
| 9509 | C4 |

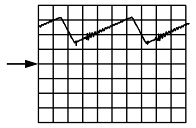
P1 Ⓘ 270V DC
P1 ⏻ 270V DC
P5 Ⓘ 13V DC
P5 ⏻ 11.5V DC

P2 Ⓘ



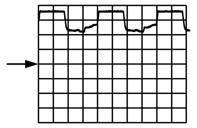
5V / div DC
5ms / div

P6 Ⓘ



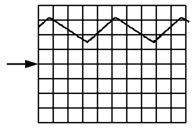
1V / div DC
5µs / div

P2 ⏻



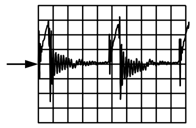
5V / div DC
5ms / div

P6 ⏻



1V / div DC
10µs / div

P3 Ⓘ



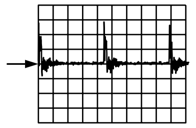
0.2V / div DC
5µs / div

P9 2V DC

P10 Ⓘ 120V DC
P10 ⏻ 120V DC

P11 Ⓘ 14V DC
P11 ⏻ 14V DC

P3 ⏻

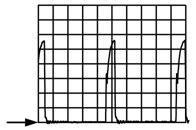


0.1V / div DC
5µs / div

P13 Ⓘ 10V8 DC
P13 ⏻ 10V2 DC

P14 Ⓘ 8V1 DC
P14 ⏻ 0V6 DC

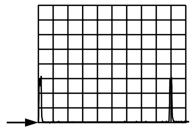
P4 Ⓘ



2V / div DC
5µs / div

P15 Ⓘ 5V DC
P15 ⏻ 5V DC

P4 ⏻



2V / div DC
5µs / div

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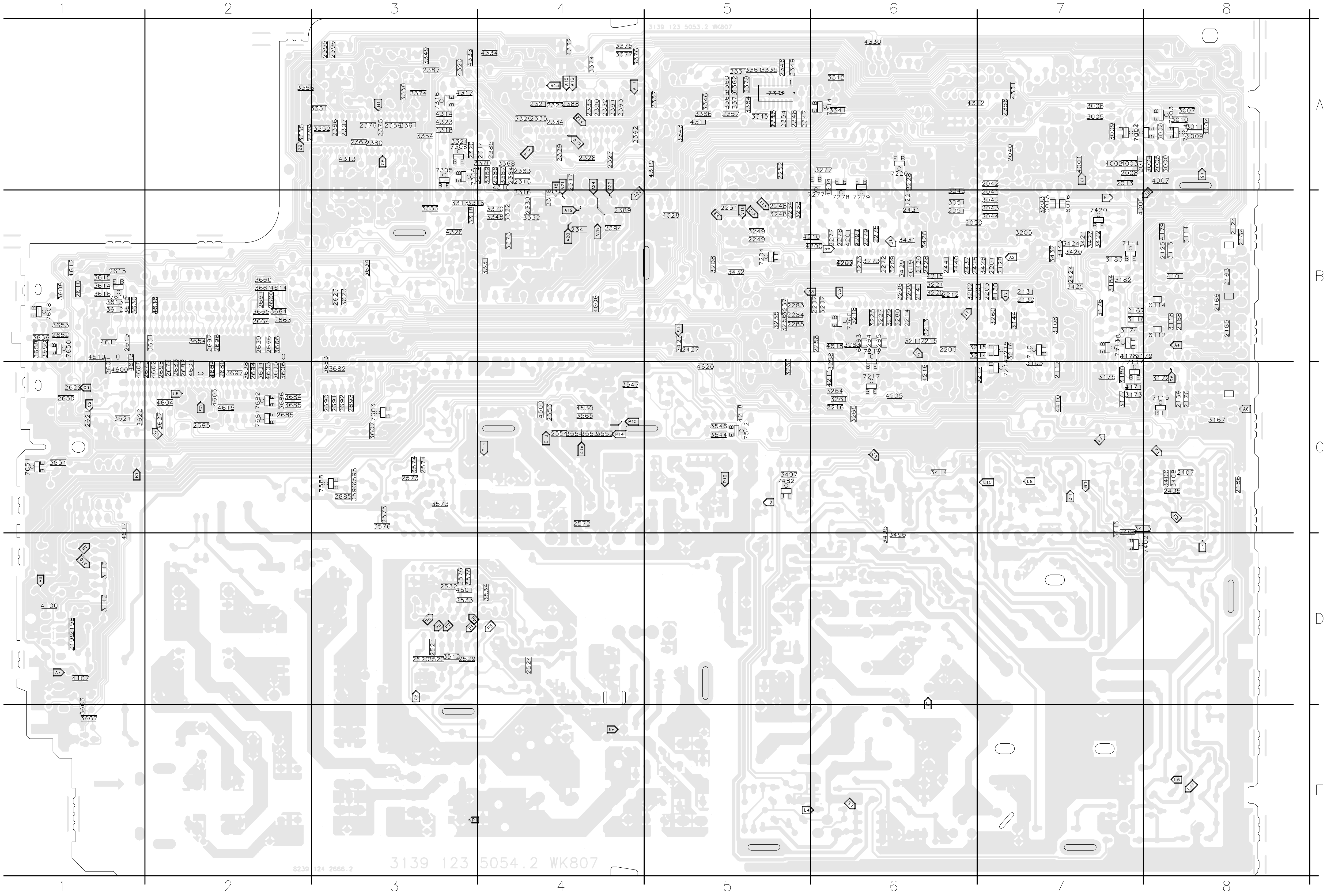

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| 1111 | D1 | 2572 | C4 | 3370 | A4 | 4612 | B1 |
| 1112 | C8 | 2573 | C3 | 3373 | B4 | 4613 | C1 |
| 1113 | C8 | 2574 | C3 | 3374 | A4 | 4614 | B2 |
| 1114 | B8 | 2575 | C3 | 3375 | A4 | 4615 | C2 |
| 1115 | B8 | 2576 | D3 | 3376 | A4 | 4616 | B2 |
| 1116 | B8 | 2601 | C1 | 3377 | A4 | 4617 | C1 |
| 1117 | B8 | 2610 | B1 | 3378 | A5 | 4618 | B6 |
| 1119 | B8 | 2613 | B1 | 3379 | A5 | 4619 | B6 |
| 1120 | B8 | 2615 | B1 | 3406 | C8 | 4620 | C5 |
| 2005 | A8 | 2621 | C1 | 3408 | C8 | 6015 | A7 |
| 2008 | A7 | 2622 | C1 | 3413 | C7 | 6016 | A7 |
| 2009 | A8 | 2623 | B3 | 3414 | C6 | 6112 | B8 |
| 2011 | A8 | 2639 | B2 | 3415 | D7 | 6114 | B8 |
| 2013 | A7 | 2650 | C1 | 3420 | B7 | 6263 | B6 |
| 2040 | A7 | 2652 | B1 | 3421 | B7 | 6264 | B6 |
| 2041 | B6 | 2660 | B2 | 3422 | B7 | 6265 | B6 |
| 2042 | A6 | 2661 | B2 | 3423 | B7 | 7001 | A8 |
| 2043 | B6 | 2663 | B2 | 3424 | B7 | 7002 | A7 |
| 2044 | B7 | 2664 | B2 | 3425 | B7 | 7003 | A8 |
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| 2051 | B6 | 2670 | B1 | 3427 | B5 | 7101 | B7 |
| 2117 | C7 | 2674 | B2 | 3428 | B6 | 7113 | B7 |
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| 2125 | B8 | 2682 | B2 | 3431 | B6 | 7115 | C8 |
| 2128 | B7 | 2683 | B2 | 3432 | B5 | 7117 | C7 |
| 2130 | B7 | 2684 | B2 | 3437 | B7 | 7118 | B7 |
| 2131 | B7 | 2685 | C2 | 3443 | B7 | 7204 | B5 |
| 2132 | B7 | 2690 | C3 | 3495 | D6 | 7214 | C7 |
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| 2163 | B8 | 2692 | C3 | 3497 | C5 | 7216 | B6 |
| 2164 | B8 | 2693 | C3 | 3512 | D3 | 7217 | C6 |
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| 2166 | B8 | 2695 | C2 | 3544 | C5 | 7260 | B6 |
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| 2201 | B7 | 3007 | A8 | 3576 | D3 | 7316 | A3 |
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| 2206 | B6 | 3009 | A7 | 3595 | C3 | 7420 | B7 |
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| 2209 | B6 | 3011 | A8 | 3604 | B2 | 7542 | C5 |
| 2212 | B6 | 3042 | B7 | 3605 | B2 | 7588 | C3 |
| 2213 | B6 | 3043 | A6 | 3606 | C2 | 7603 | C3 |
| 2214 | B6 | 3051 | B6 | 3607 | C3 | 7608 | B1 |
| 2215 | B6 | 3105 | C7 | 3608 | B1 | 7610 | B1 |
| 2216 | C6 | 3108 | B7 | 3610 | B1 | 7650 | B1 |
| 2221 | B6 | 3114 | B8 | 3612 | B1 | 7651 | C1 |
| 2222 | B6 | 3115 | B8 | 3613 | B1 | 7681 | C2 |
| 2228 | A6 | 3116 | B8 | 3614 | B1 | 7682 | C2 |
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| 2249 | B5 | 3142 | D1 | 3616 | B1 | T482 | C4 |
| 2251 | B5 | 3143 | D1 | 3621 | C1 | | |
| 2252 | A5 | 3144 | B7 | 3622 | C1 | | |
| 2254 | B5 | 3167 | C8 | 3623 | B3 | | |
| 2258 | B5 | 3171 | C7 | 3627 | C2 | | |
| 2272 | B6 | 3172 | C8 | 3630 | B1 | | |
| 2273 | B6 | 3173 | C7 | 3631 | B2 | | |
| 2275 | B6 | 3174 | B7 | 3633 | B2 | | |
| 2277 | B6 | 3175 | C7 | 3634 | B3 | | |
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| 2283 | B5 | 3178 | B7 | 3653 | B1 | | |
| 2284 | B5 | 3179 | B8 | 3654 | B2 | | |
| 2285 | B5 | 3180 | C7 | 3656 | B1 | | |
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| 2315 | A4 | 3183 | B7 | 3660 | B2 | | |
| 2316 | B4 | 3184 | B7 | 3661 | B2 | | |
| 2317 | A4 | 3201 | B7 | 3663 | E1 | | |
| 2318 | B4 | 3202 | B6 | 3664 | B2 | | |
| 2320 | A3 | 3203 | B7 | 3665 | B2 | | |
| 2321 | A4 | 3205 | B7 | 3666 | B2 | | |
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| 2327 | A4 | 3208 | B5 | 3682 | C3 | | |
| 2328 | A4 | 3209 | B6 | 3683 | C3 | | |
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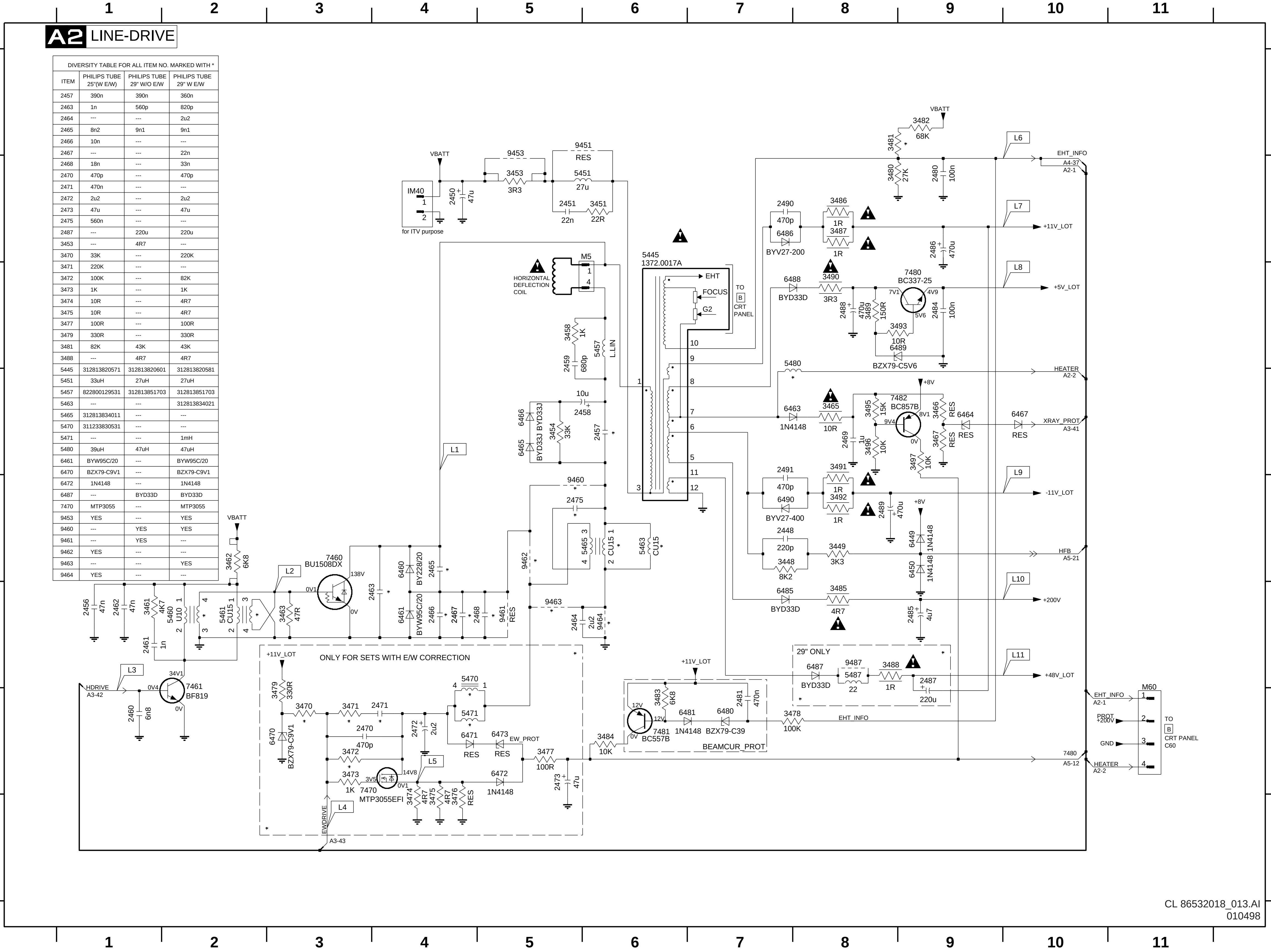
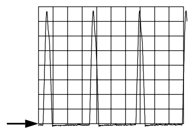
| 2332 | A4 | 3214 | B6 | 3685 | C2 | | |
| 2333 | A4 | 3215 | B6 | 3686 | C2 | | |
| 2334 | A4 | 3216 | B7 | 3697 | C2 | | |
| 2335 | A4 | 3217 | C7 | 3698 | B2 | | |
| 2337 | A5 | 3218 | B6 | 4001 | A7 | | |
| 2339 | B4 | 3220 | B6 | 4002 | A7 | | |
| 2341 | B4 | 3221 | B6 | 4003 | A7 | | |
| 2346 | A5 | 3224 | B6 | 4004 | A8 | | |
| 2347 | A5 | 3225 | B6 | 4005 | B8 | | |
| 2348 | A5 | 3227 | B6 | 4007 | A8 | | |
| 2349 | A5 | 3229 | B6 | 4100 | D1 | | |
| 2351 | A5 | 3248 | B5 | 4101 | B8 | | |
| 2354 | A5 | 3249 | B5 | 4107 | D1 | | |
| 2355 | A5 | 3253 | B5 | 4130 | B7 | | |
| 2357 | A5 | 3255 | B5 | 4171 | C8 | | |
| 2358 | A7 | 3256 | B5 | 4178 | B7 | | |
| 2359 | A3 | 3257 | B5 | 4179 | B8 | | |
| 2361 | A3 | 3258 | B6 | 4200 | B6 | | |
| 2366 | A3 | 3260 | B7 | 4201 | B6 | | |
| 2367 | A3 | 3261 | C6 | 4202 | B6 | | |
| 2369 | A2 | 3262 | C5 | 4203 | B6 | | |
| 2374 | A3 | 3263 | B6 | 4204 | B6 | | |
| 2375 | A3 | 3264 | C6 | 4205 | C6 | | |
| 2376 | A3 | 3265 | C6 | 4210 | B6 | | |
| 2380 | A3 | 3273 | B6 | 4211 | C6 | | |
| 2383 | A4 | 3277 | A6 | 4215 | B6 | | |
| 2384 | A4 | 3280 | B6 | 4216 | C6 | | |
| 2385 | A4 | 3313 | B3 | 4218 | C5 | | |
| 2386 | A4 | 3314 | A3 | 4310 | A4 | | |
| 2387 | A3 | 3316 | B3 | 4311 | A5 | | |
| 2388 | A4 | 3318 | B3 | 4312 | A7 | | |
| 2389 | B4 | 3320 | B4 | 4313 | A3 | | |
| 2390 | A4 | 3322 | B4 | 4314 | A3 | | |
| 2391 | A4 | 3324 | A3 | 4315 | A5 | | |
| 2392 | A4 | 3329 | A4 | 4317 | A3 | | |
| 2393 | A4 | 3331 | B4 | 4318 | A3 | | |
| 2394 | B4 | 3332 | B4 | 4319 | A5 | | |
| 2395 | A3 | 3339 | A5 | 4320 | A3 | | |
| 2396 | A3 | 3341 | A6 | 4323 | A3 | | |
| 2397 | A3 | 3342 | A6 | 4326 | B3 | | |
| 2405 | C8 | 3343 | A5 | 4328 | B5 | | |
| 2406 | C7 | 3345 | A5 | 4330 | A6 | | |
| 2407 | C8 | 3346 | A5 | 4331 | A7 | | |
| 2420 | B6 | 3348 | B4 | 4332 | A4 | | |
| 2424 | B7 | 3349 | A3 | 4333 | A3 | | |
| 2425 | B6 | 3350 | A3 | 4334 | A4 | | |
| 2427 | B5 | 3351 | A2 | 4410 | C7 | | |
| 2428 | B6 | 3352 | A3 | 4500 | C4 | | |
| 2431 | B6 | 3353 | B3 | 4501 | D3 | | |
| 2437 | B6 | 3354 | A3 | 4530 | C4 | | |
| 2440 | B6 | 3355 | A2 | 4600 | C1 | | |
| 2441 | B6 | 3356 | A2 | 4601 | B2 | | |
| 2520 | D3 | 3360 | A5 | 4602 | B2 | | |
| 2521 | D3 | 3361 | A5 | 4603 | B2 | | |
| 2522 | D3 | 3362 | A5 | 4604 | C2 | | |
| 2524 | D4 | 3364 | A5 | 4605 | C2 | | |
| 2529 | D3 | 3365 | A5 | 4606 | B4 | | |
| 2532 | D3 | 3366 | A5 | 4607 | C2 | | |
| 2533 | D4 | 3367 | A4 | 4608 | B1 | | |
| 2553 | C4 | 3368 | A4 | 4610 | B1 | | |


A2 LINE-DRIVE
1 2 3 4 5 6 7 8 9 10 11
A B C D E F G H
VBATT
IM40
for ITV purpose
2450 47u
9453
3453 3R3
9451 RES
5451 27u
2451 22n
3451 22R
HORIZONTAL DEFLECTION COIL
M5
5445 1372.0017A
EHT
FOCUS
G2
TO B CRT PANEL
3458 1K
2459 680p
5457 L.LIN
10u 2458
6466 BYD33J
6465 BYD33J
3454 33K
2457
L1
9460
2475
5465 CU15
5463 CU15
9462
9463
2464 2u2
9464
3462 6K8
L2
7460 BU1508DX
138V
0V1
0V
2463
6460 BY228/20
2465
6461 BYW95C/20
2466
2467
2468
9461 RES
2456 47n
2462 47n
3461 4K7
5460 U10
5461 CU15
3463 47R
2461 1n
L3
HDRIVE A3-42
7461 BF819
34V1
0V4
0V
2460 6n8
ONLY FOR SETS WITH E/W CORRECTION
+11V_LOT
3479 330R
6470 BZX79-C9V1
3470
3471
2471
2470 470p
3472
3473 1K
7470 MTP3055EFI
3V5
0V1
14V8
L5
2472 2u2
5470
5471
6471 RES
6473 RES
EW_PROT
3474 4R7
3475 4R7
3476 RES
6472 1N4148
3477 100R
2473 47u
L4
EWDRIVE A3-43
3484 10K
7481 BC557B
12V
0V
3483 6K8
6481 1N4148
6480 BZX79-C39
2481 470n
BEAMCUR_PROT
3478 100K
EHT_INFO
VBATT
3482 68K
3481
3480 27K
2480 100n
L6
EHT_INFO A4-37 A2-1
2490 470p
6486 BYV27-200
3486 1R
3487 1R
L7
+11V_LOT
2486 470u
6488 BYD33D
3490 3R3
2488 470u
3489 150R
7480 BC337-25
7V1
4V9
5V6
2484 100n
3493 10R
6489 BZX79-C5V6
L8
+5V_LOT
5480
HEATER A2-2
+8V
6463 1N4148
3465 10R
2469 1u
3495 15K
3496 10K
7482 BC857B
9V4
8V1
0V
3466 RES
3467 RES
6464 RES
6467 RES
XRAY_PROT A3-41
3497 10K
2491 470p
6490 BYV27-400
3491 1R
3492 1R
2489 470u
L9
-11V_LOT
2448 220p
3448 8K2
3449 3K3
6449 1N4148
6450 1N4148
HFB A5-21
6485 BYD33D
3485 4R7
L10
2485 4u7
+200V
29" ONLY
6487 BYD33D
9487
5487 22
3488 1R
2487 220u
L11
+48V_LOT
7480 A5-12
M60
EHT_INFO A2-1
PROT +200V
GND
HEATER A2-2
TO B CRT PANEL C60
CL 86532018_013.AI
010498

| DIVERSITY TABLE FOR ALL ITEM NO. MARKED WITH * | | | |
|---|---|---|---|
| ITEM | PHILIPS TUBE 25"(W E/W) | PHILIPS TUBE 29" W/O E/W | PHILIPS TUBE 29" W E/W |
| 2457 | 390n | 390n | 360n |
| 2463 | 1n | 560p | 820p |
| 2464 | --- | --- | 2u2 |
| 2465 | 8n2 | 9n1 | 9n1 |
| 2466 | 10n | --- | --- |
| 2467 | --- | --- | 22n |
| 2468 | 18n | --- | 33n |
| 2470 | 470p | --- | 470p |
| 2471 | 470n | --- | --- |
| 2472 | 2u2 | --- | 2u2 |
| 2473 | 47u | --- | 47u |
| 2475 | 560n | --- | --- |
| 2487 | --- | 220u | 220u |
| 3453 | --- | 4R7 | --- |
| 3470 | 33K | --- | 220K |
| 3471 | 220K | --- | --- |
| 3472 | 100K | --- | 82K |
| 3473 | 1K | --- | 1K |
| 3474 | 10R | --- | 4R7 |
| 3475 | 10R | --- | 4R7 |
| 3477 | 100R | --- | 100R |
| 3479 | 330R | --- | 330R |
| 3481 | 82K | 43K | 43K |
| 3488 | --- | 4R7 | 4R7 |
| 5445 | 312813820571 | 312813820601 | 312813820581 |
| 5451 | 33uH | 27uH | 27uH |
| 5457 | 822800129531 | 312813851703 | 312813851703 |
| 5463 | --- | --- | 312813834021 |
| 5465 | 312813834011 | --- | --- |
| 5470 | 311233830531 | --- | --- |
| 5471 | --- | --- | 1mH |
| 5480 | 39uH | 47uH | 47uH |
| 6461 | BYW95C/20 | --- | BYW95C/20 |
| 6470 | BZX79-C9V1 | --- | BZX79-C9V1 |
| 6472 | 1N4148 | --- | 1N4148 |
| 6487 | --- | BYD33D | BYD33D |
| 7470 | MTP3055 | --- | MTP3055 |
| 9453 | YES | --- | YES |
| 9460 | --- | YES | YES |
| 9461 | --- | YES | --- |
| 9462 | YES | --- | --- |
| 9463 | --- | --- | YES |
| 9464 | YES | --- | --- |

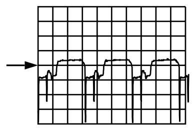
| | |
|---|---|
| **M5** | **B5** |
| **M60** | **G11** |
| **2448** | **E7** |
| **2450** | **B4** |
| **2451** | **B5** |
| **2456** | **F1** |
| **2457** | **D6** |
| **2458** | **D6** |
| **2459** | **C5** |
| **2460** | **G1** |
| **2461** | **F1** |
| **2462** | **F1** |
| **2463** | **F4** |
| **2464** | **F5** |
| **2465** | **E4** |
| **2466** | **F4** |
| **2467** | **F4** |
| **2468** | **F5** |
| **2469** | **D8** |
| **2470** | **G3** |
| **2471** | **G4** |
| **2472** | **G4** |
| **2473** | **G5** |
| **2475** | **E5** |
| **2480** | **B9** |
| **2481** | **G7** |
| **2484** | **C9** |
| **2485** | **F9** |
| **2486** | **B9** |
| **2487** | **F9** |
| **2488** | **C8** |
| **2489** | **E8** |
| **2490** | **B7** |
| **2491** | **D7** |
| **3448** | **E7** |
| **3449** | **E8** |
| **3451** | **B6** |
| **3453** | **B5** |
| **3454** | **D5** |
| **3458** | **C5** |
| **3461** | **F1** |
| **3462** | **E2** |
| **3463** | **F3** |
| **3465** | **D8** |
| **3466** | **D9** |
| **3467** | **D9** |
| **3470** | **G3** |
| **3471** | **G3** |
| **3472** | **G3** |
| **3473** | **G3** |
| **3474** | **H4** |
| **3475** | **H4** |
| **3476** | **H4** |
| **3477** | **G5** |
| **3478** | **G7** |
| **3479** | **G3** |
| **3480** | **B8** |
| **3481** | **A8** |
| **3482** | **A9** |
| **3483** | **G6** |
| **3484** | **G6** |
| **3485** | **F8** |
| **3486** | **B8** |
| **3487** | **B8** |
| **3488** | **F8** |
| **3489** | **C8** |
| **3490** | **C8** |
| **3491** | **D8** |
| **3492** | **E8** |
| **3493** | **C9** |
| **3495** | **D8** |
| **3496** | **D8** |
| **3497** | **D9** |
| **5445** | **B6** |
| **5451** | **B6** |
| **5457** | **C6** |
| **5460** | **F2** |
| **5461** | **F2** |
| **5463** | **E6** |
| **5465** | **E6** |
| **5470** | **F4** |
| **5471** | **G4** |
| **5480** | **C8** |
| **5487** | **F8** |
| **6449** | **E9** |
| **6450** | **E9** |
| **6460** | **E4** |
| **6461** | **F4** |
| **6463** | **D7** |
| **6464** | **D9** |
| **6465** | **D5** |
| **6466** | **D5** |
| **6467** | **D10** |
| **6470** | **G3** |
| **6471** | **G4** |
| **6472** | **G5** |
| **6473** | **G5** |
| **6480** | **G7** |
| **6481** | **G6** |
| **6485** | **F7** |
| **6486** | **B7** |
| **6487** | **F8** |
| **6488** | **C7** |
| **6489** | **C9** |
| **6490** | **E7** |
| **7460** | **E3** |
| **7461** | **G2** |
| **7470** | **G3** |
| **7480** | **C9** |
| **7481** | **G6** |
| **7482** | **D8** |
| **9451** | **A6** |
| **9453** | **B5** |
| **9460** | **E5** |
| **9461** | **F5** |
| **9462** | **E5** |
| **9463** | **F5** |
| **9464** | **F6** |
| **9487** | **F8** |
| **IM40** | **B4** |

L1



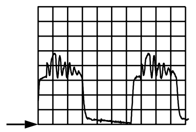
100V / div DC
20µs / div

L2



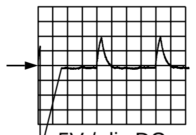
2V / div DC
20µs / div

L3



200mV / div DC
10µs / div

L6



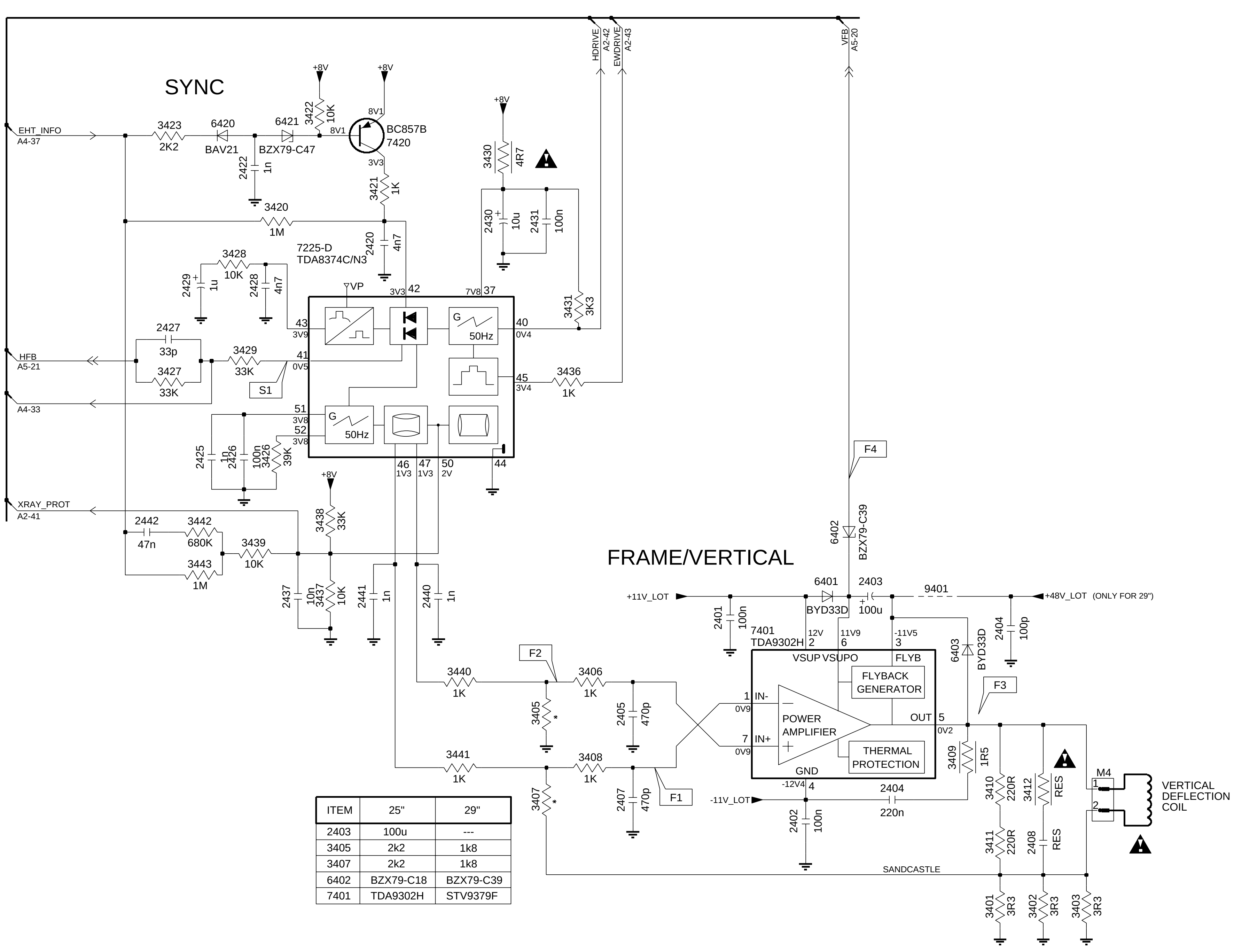
5V / div DC
5ms / div

L8 5.0V DC

L9 -11.7V DC

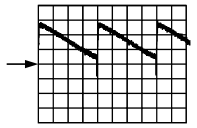
CL 86532018_003.AI

## A3 SYNC/FRAME/VERTICAL DRIVE


SYNC
FRAME/VERTICAL
EHT_INFO
A4-37
HFB
A5-21
A4-33
XRAY_PROT
A2-41
HDRIVE
A2-42
EWDRIVE
A2-43
VFB
A5-20
+8V
3423
2K2
6420
BAV21
6421
BZX79-C47
2422
1n
3422
10K
8V1
BC857B
7420
3V3
3421
1K
3420
1M
2420
4n7
7225-D
TDA8374C/N3
3428
10K
2429
1u
2428
4n7
VP
42
37
7V8
43
3V9
41
0V5
40
0V4
45
3V4
51
3V8
52
50Hz
G
46
1V3
47
50
2V
44
2427
33p
3429
33K
3427
33K
S1
2425
1n
2426
100n
3426
39K
3430
4R7
2430
10u
2431
100n
3431
3K3
3436
1K
F4
6402
BZX79-C39
2442
47n
3442
680K
3439
10K
3443
1M
3438
33K
2437
10n
3437
10K
2441
1n
2440
1n
F2
3440
1K
3406
1K
3405
2405
470p
3441
1K
3408
1K
3407
2407
470p
F1
+11V_LOT
2401
100n
6401
BYD33D
2403
100u
9401
+48V_LOT (ONLY FOR 29")
2404
100p
6403
BYD33D
7401
TDA9302H
12V
2
11V9
6
-11V5
3
VSUP
VSUPO
FLYB
FLYBACK GENERATOR
IN-
IN+
0V9
1
7
POWER AMPLIFIER
OUT
5
0V2
THERMAL PROTECTION
GND
-12V4
4
F3
3409
1R5
-11V_LOT
2402
100n
2404
220n
3410
220R
3412
RES
3411
220R
2408
RES
M4
VERTICAL DEFLECTION COIL
SANDCASTLE
3401
3R3
3402
3R3
3403
3R3

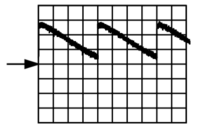
| ITEM | 25" | 29" |
|---|---|---|
| 2403 | 100u | --- |
| 3405 | 2k2 | 1k8 |
| 3407 | 2k2 | 1k8 |
| 6402 | BZX79-C18 | BZX79-C39 |
| 7401 | TDA9302H | STV9379F |

F1



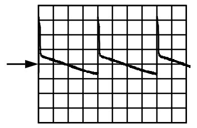
0.5mV / div DC
5ms / div

F2



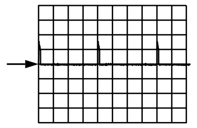
0.5mV / div DC
5ms / div

F3



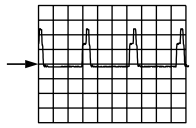
10V / div DC
5ms / div

F4



10V / div DC
5ms / div

S1

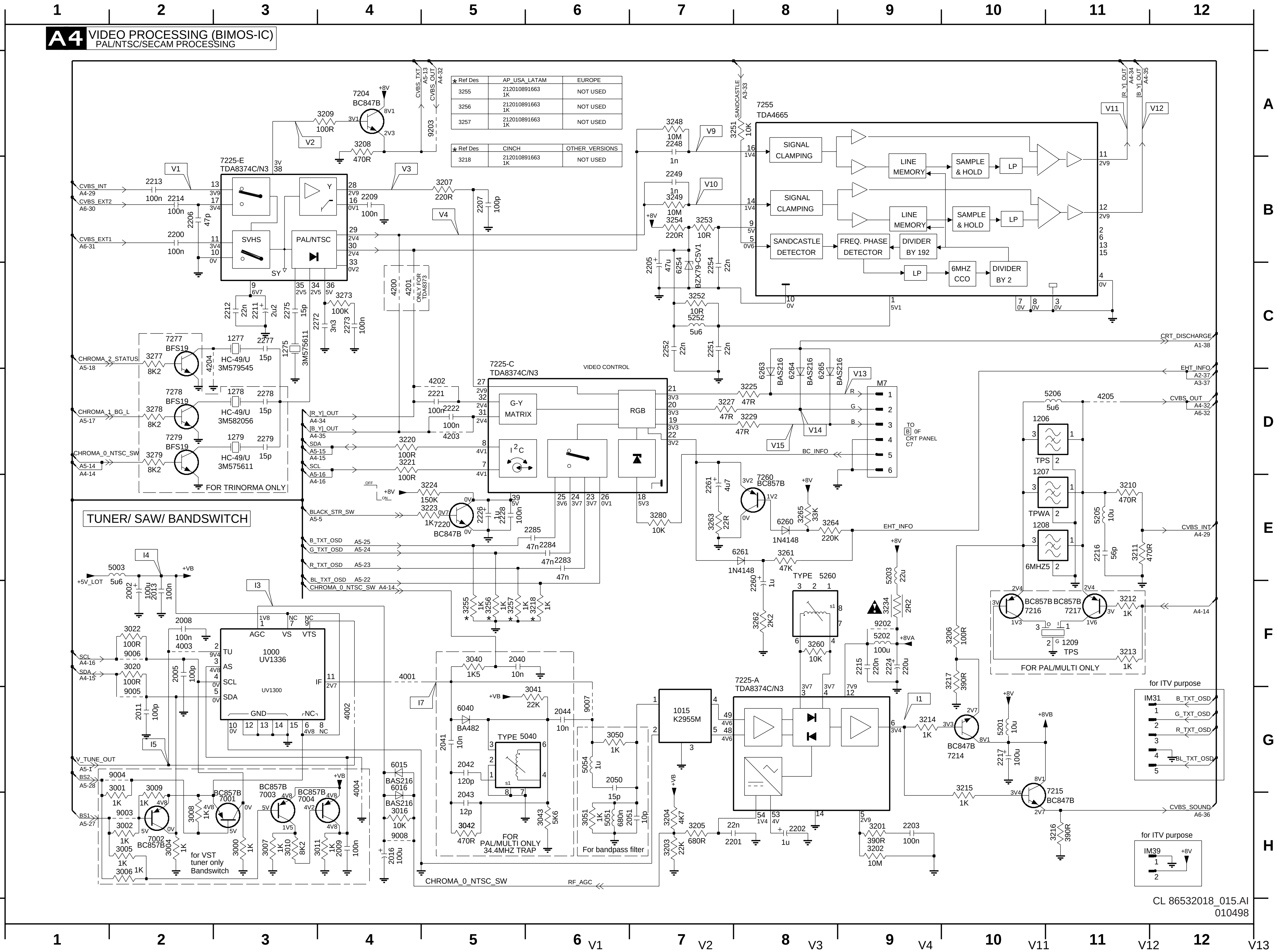


2V / div DC
20µs / div

CL 86532018_004.AI
270398

CL 86532018_014.AI
010498

| | |
|---|---|
| M4 | F11 |
| 2401 | E8 |
| 2402 | F9 |
| 2403 | E9 |
| 2404 | E10 |
| 2404 | F9 |
| 2405 | F7 |
| 2407 | F7 |
| 2408 | G10 |
| 2420 | C6 |
| 2422 | B5 |
| 2425 | D5 |
| 2426 | D5 |
| 2427 | C4 |
| 2428 | C5 |
| 2429 | C4 |
| 2430 | B6 |
| 2431 | B7 |
| 2437 | E5 |
| 2440 | E6 |
| 2441 | E6 |
| 2442 | D4 |
| 3401 | G10 |
| 3402 | G10 |
| 3403 | G10 |
| 3405 | F7 |
| 3406 | E7 |
| 3407 | F7 |
| 3408 | F7 |
| 3409 | F10 |
| 3410 | F10 |
| 3411 | G10 |
| 3412 | F10 |
| 3420 | B5 |
| 3421 | B6 |
| 3422 | B5 |
| 3423 | B4 |
| 3426 | D5 |
| 3427 | C4 |
| 3428 | C5 |
| 3429 | C5 |
| 3430 | B6 |
| 3431 | C7 |
| 3436 | C7 |
| 3437 | E5 |
| 3438 | D5 |
| 3439 | E5 |
| 3440 | E6 |
| 3441 | F6 |
| 3442 | D5 |
| 3443 | E5 |
| 6401 | E9 |
| 6402 | D9 |
| 6403 | E10 |
| 6420 | B5 |
| 6421 | B5 |
| 7225-D | C5 |
| 7401 | E8 |
| 7420 | B6 |
| 9401 | E9 |


A4 VIDEO PROCESSING (BIMOS-IC)
PAL/NTSC/SECAM PROCESSING
7225-E TDA8374C/N3
SVHS
PAL/NTSC
SY
7204 BC847B
7255 TDA4665
SIGNAL CLAMPING
LINE MEMORY
SAMPLE & HOLD
LP
SANDCASTLE DETECTOR
FREQ. PHASE DETECTOR
DIVIDER BY 192
6MHZ CCO
DIVIDER BY 2
SANDCASTLE A3-33
CVBS_TXT A5-13
CVBS_OUT A4-32
(R_Y)_OUT A4-34
(B_Y)_OUT A4-35
CVBS_INT A4-29
CVBS_EXT2 A6-30
CVBS_EXT1 A6-31
CHROMA_2_STATUS A5-18
CHROMA_1_BG_L A5-17
CHROMA_0_NTSC_SW A5-14 A4-14
7277 BFS19
7278 BFS19
7279 BFS19
HC-49/U 3M579545
HC-49/U 3M582056
HC-49/U 3M575611
FOR TRINORMA ONLY
7225-C TDA8374C/N3
VIDEO CONTROL
G-Y MATRIX
RGB
I2C
SDA A5-15 A4-15
SCL A5-16 A4-16
BLACK_STR_SW A5-5
B_TXT_OSD A5-25
G_TXT_OSD A5-24
R_TXT_OSD A5-23
BL_TXT_OSD A5-22
CHROMA_0_NTSC_SW A4-14
7220 BC847B
7260 BC857B
M7
TO 0F CRT PANEL C7
CRT_DISCHARGE A1-38
EHT_INFO A2-37 A3-37
BC_INFO
EHT_INFO
CVBS_OUT A4-32 A6-32
CVBS_INT A4-29
TPS
TPWA
6MHZ5
7216 BC857B
7217 BC857B
1209 TPS
FOR PAL/MULTI ONLY
A4-14
TUNER/ SAW/ BANDSWITCH
+5V_LOT
1000 UV1336
AGC VS VTS
TU AS SCL SDA
IF
GND NC
UV1300
SCL A4-16
SDA A4-15
V_TUNE_OUT
A5-1
BS2 A5-28
BS1 A5-27
7001 BC857B
7002 BC857B
7003 BC857B
7004 BC857B
for VST tuner only Bandswitch
6040 BA482
TYPE 5040
FOR PAL/MULTI ONLY 34.4MHZ TRAP
For bandpass filter
1015 K2955M
7225-A TDA8374C/N3
TYPE 5260
7214 BC847B
7215 BC847B
CVBS_SOUND A6-36
for ITV purpose
IM31
B_TXT_OSD
G_TXT_OSD
R_TXT_OSD
BL_TXT_OSD
IM39
CHROMA_0_NTSC_SW
RF_AGC
1 2 3 4 5 6 7 8 9 10 11 12
A B C D E F G H

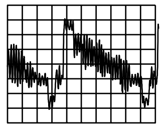
| * Ref Des | AP_USA_LATAM | EUROPE |
|---|---|---|
| 3255 | 212010891663<br>1K | NOT USED |
| 3256 | 212010891663<br>1K | NOT USED |
| 3257 | 212010891663<br>1K | NOT USED |

| * Ref Des | CINCH | OTHER_VERSIONS |
|---|---|---|
| 3218 | 212010891663<br>1K | NOT USED |

CL 86532018_015.AI
010498

| | |
|---|---|
| M7 | D9 |
| 1000 | F3 |
| 1015 | G7 |
| 1206 | D10 |
| 1207 | D10 |
| 1208 | E10 |
| 1209 | F11 |
| 1275 | C3 |
| 1277 | C3 |
| 1278 | D3 |
| 1279 | D3 |
| 2002 | F2 |
| 2005 | F2 |
| 2008 | F2 |
| 2009 | H4 |
| 2011 | G2 |
| 2013 | F2 |
| 2016 | H4 |
| 2040 | F5 |
| 2041 | G5 |
| 2042 | G5 |
| 2043 | H5 |
| 2044 | G6 |
| 2050 | G6 |
| 2051 | H7 |
| 2200 | B2 |
| 2201 | H7 |
| 2202 | H8 |
| 2203 | H9 |
| 2205 | C7 |
| 2206 | B2 |
| 2207 | B5 |
| 2209 | B4 |
| 2211 | C3 |
| 2212 | C3 |
| 2213 | B2 |
| 2214 | B2 |
| 2215 | F9 |
| 2216 | E11 |
| 2217 | G10 |
| 2221 | D5 |
| 2222 | D5 |
| 2224 | F9 |
| 2226 | E5 |
| 2228 | E5 |
| 2248 | A7 |
| 2249 | B7 |
| 2251 | C7 |
| 2252 | C7 |
| 2254 | C7 |
| 2260 | F8 |
| 2261 | E7 |
| 2272 | C4 |
| 2273 | C4 |
| 2275 | C3 |
| 2277 | C3 |
| 2278 | D3 |
| 2279 | D3 |
| 2283 | E6 |
| 2284 | E6 |
| 2285 | E6 |
| 3000 | H3 |
| 3001 | G2 |
| 3002 | H2 |
| 3004 | H2 |
| 3005 | H2 |
| 3006 | H2 |
| 3007 | H3 |
| 3008 | H2 |
| 3009 | G2 |
| 3010 | H3 |
| 3011 | H4 |
| 3016 | H4 |
| 3020 | F2 |
| 3022 | F2 |
| 3040 | F5 |
| 3041 | G6 |
| 3042 | H5 |
| 3043 | H6 |
| 3050 | G6 |
| 3051 | H6 |
| 3201 | H9 |
| 3202 | H9 |
| 3203 | H7 |
| 3204 | H7 |
| 3205 | H7 |
| 3206 | F10 |
| 3207 | B5 |
| 3208 | A4 |
| 3209 | A4 |
| 3210 | E11 |
| 3211 | E11 |
| 3212 | F11 |
| 3213 | F11 |
| 3214 | G9 |
| 3215 | G10 |
| 3216 | H11 |
| 3217 | F10 |
| 3218 | F6 |
| 3220 | D4 |
| 3221 | D4 |
| 3223 | E5 |
| 3224 | E5 |
| 3225 | D8 |
| 3227 | D7 |
| 3229 | D8 |
| 3234 | F9 |
| 3248 | A7 |
| 3249 | B7 |
| 3251 | A8 |
| 3252 | C7 |
| 3253 | B7 |
| 3254 | B7 |
| 3255 | F5 |
| 3256 | F5 |
| 3257 | F5 |
| 3260 | F8 |
| 3261 | E8 |
| 3262 | F8 |
| 3263 | E7 |
| 3264 | E8 |
| 3265 | E8 |
| 3273 | C4 |
| 3277 | C2 |
| 3278 | D2 |
| 3279 | D2 |
| 3280 | E7 |
| 4001 | F4 |
| 4002 | G4 |
| 4003 | F2 |
| 4004 | G4 |
| 4200 | C4 |
| 4201 | C4 |
| 4202 | D5 |
| 4203 | D5 |
| 4204 | C2 |
| 4205 | D11 |
| 5003 | E2 |
| 5040 | G6 |
| 5051 | H6 |
| 5054 | G6 |
| 5201 | G10 |
| 5202 | F9 |
| 5203 | E9 |
| 5205 | E11 |
| 5206 | D11 |
| 5252 | C7 |
| 5260 | E8 |
| 6015 | G4 |
| 6016 | G4 |
| 6040 | G5 |
| 6254 | C7 |
| 6260 | E8 |
| 6261 | E8 |
| 6263 | D8 |
| 6264 | D8 |
| 6265 | D8 |
| 7001 | H3 |
| 7002 | H2 |
| 7003 | G3 |
| 7004 | H3 |
| 7204 | A4 |
| 7214 | G10 |
| 7215 | H11 |
| 7216 | F10 |
| 7217 | F11 |
| 7220 | E5 |
| 7225-A | F8 |
| 7225-C | C5 |
| 7225-E | B3 |
| 7255 | A8 |
| 7260 | D8 |
| 7277 | C2 |
| 7278 | D2 |
| 7279 | D2 |
| 9003 | H2 |
| 9004 | G2 |
| 9005 | G2 |
| 9006 | F2 |
| 9007 | G6 |
| 9008 | H4 |
| 9202 | F9 |
| 9203 | A5 |
| IM31 | G11 |
| IM39 | H12 |

I1



500mV / div AC
10µs / div

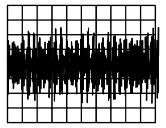
I3 1.6V DC

I3 4.0V DC

I4 5.0V DC

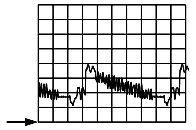
I5 0.5 - 30V DC

I7



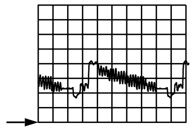
50mV / div AC
500ms / div

V1



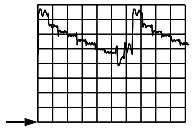
500mV / div DC
10µs / div

V2



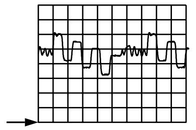
1V / div DC
10µs / div

V3



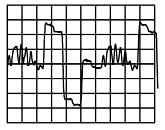
500mV / div DC
10µs / div

V4



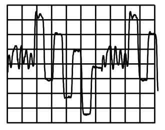
500mV / div DC
10µs / div

V11



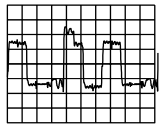
200mV / div AC
10µs / div

V12



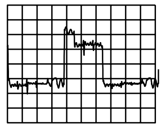
200mV / div AC
10µs / div

V13



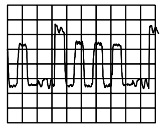
500mV / div AC
10µs / div

V14



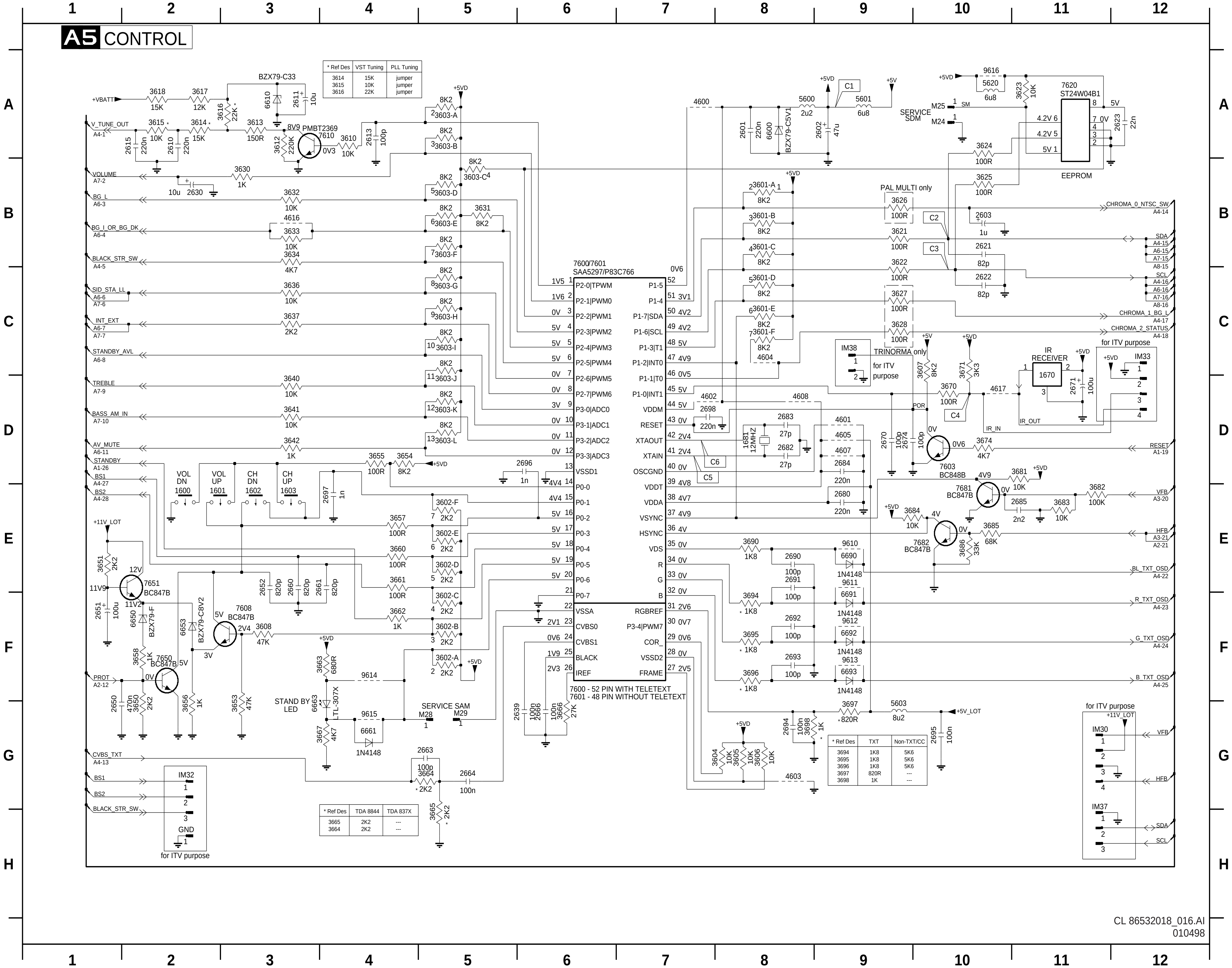
500mV / div AC
10µs / div

V15



500mV / div AC
10µs / div

CL 86532018_005.AI
270398


A5 CONTROL
1 2 3 4 5 6 7 8 9 10 11 12
A B C D E F G H
7600/7601
SAA5297/P83C766
P2-0|TPWM
P2-1|PWM0
P2-2|PWM1
P2-3|PWM2
P2-4|PWM3
P2-5|PWM4
P2-6|PWM5
P2-7|PWM6
P3-0|ADC0
P3-1|ADC1
P3-2|ADC2
P3-3|ADC3
VSSD1
P0-0
P0-1
P0-2
P0-3
P0-4
P0-5
P0-6
P0-7
VSSA
CVBS0
CVBS1
BLACK
IREF
P1-5
P1-4
P1-7|SDA
P1-6|SCL
P1-3|T1
P1-2|INT0
P1-1|T0
P1-0|INT1
VDDM
RESET
XTAOUT
XTAIN
OSCGND
VDDT
VDDA
VSYNC
HSYNC
VDS
R
G
B
RGBREF
P3-4|PWM7
COR
VSSD2
FRAME
7600 - 52 PIN WITH TELETEXT
7601 - 48 PIN WITHOUT TELETEXT
+VBATT
V_TUNE_OUT
VOLUME
BG_L
BG_I_OR_BG_DK
BLACK_STR_SW
SID_STA_LL
INT_EXT
STANDBY_AVL
TREBLE
BASS_AM_IN
AV_MUTE
STANDBY
BS1
BS2
+11V_LOT
PROT
CVBS_TXT
BZX79-C33
PMBT2369
BZX79-C5V1
BZX79-C8V2
BZX79-F
BC847B
BC848B
1N4148
LTL-307X
VOL DN
VOL UP
CH DN
CH UP
STAND BY LED
SERVICE SAM
SERVICE SDM
PAL MULTI only
TRINORMA only
for ITV purpose
IR RECEIVER
IR_OUT
IR_IN
POR
7620
ST24W04B1
EEPROM
12MHZ
CHROMA_0_NTSC_SW
CHROMA_1_BG_L
CHROMA_2_STATUS
SDA
SCL
RESET
VFB
HFB
BL_TXT_OSD
R_TXT_OSD
G_TXT_OSD
B_TXT_OSD
+5V_LOT
IM30
IM32
IM33
IM37
IM38
GND
C1 C2 C3 C4 C5 C6
CL 86532018_016.AI
010498

| * Ref Des | VST Tuning | PLL Tuning |
|---|---|---|
| 3614 | 15K | jumper |
| 3615 | 10K | jumper |
| 3616 | 22K | jumper |

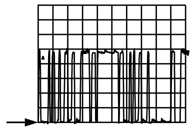
| * Ref Des | TDA 8844 | TDA 837X |
|---|---|---|
| 3665 | 2K2 | --- |
| 3664 | 2K2 | --- |

| * Ref Des | TXT | Non-TXT/CC |
|---|---|---|
| 3694 | 1K8 | 5K6 |
| 3695 | 1K8 | 5K6 |
| 3696 | 1K8 | 5K6 |
| 3697 | 820R | --- |
| 3698 | 1K | --- |

| | |
|---|---|
| GND | H2 |
| M24 | A10 |
| M25 | A10 |
| M28 | G5 |
| M29 | G5 |
| 1600 | E2 |
| 1601 | E2 |
| 1602 | E3 |
| 1603 | E3 |
| 1670 | D11 |
| 1681 | D8 |
| 2601 | A8 |
| 2602 | A9 |
| 2603 | B10 |
| 2610 | A2 |
| 2611 | A3 |
| 2613 | A4 |
| 2615 | A2 |
| 2621 | B10 |
| 2622 | C10 |
| 2623 | A12 |
| 2630 | B2 |
| 2639 | G6 |
| 2650 | G1 |
| 2651 | F1 |
| 2652 | E3 |
| 2660 | E3 |
| 2661 | E4 |
| 2663 | G5 |
| 2664 | G5 |
| 2666 | G6 |
| 2670 | D9 |
| 2671 | D11 |
| 2674 | D9 |
| 2680 | E9 |
| 2682 | D8 |
| 2683 | D8 |
| 2684 | D9 |
| 2685 | E11 |
| 2690 | E8 |
| 2691 | E8 |
| 2692 | F8 |
| 2693 | F8 |
| 2694 | G8 |
| 2695 | G10 |
| 2696 | D6 |
| 2697 | E4 |
| 2698 | D7 |
| 3601-A | B8 |
| 3601-B | B8 |
| 3601-C | B8 |
| 3601-D | C8 |
| 3601-E | C8 |
| 3601-F | C8 |
| 3602-A | F5 |
| 3602-B | F5 |
| 3602-C | F5 |
| 3602-D | E5 |
| 3602-E | E5 |
| 3602-F | E5 |
| 3603-A | A5 |
| 3603-B | A5 |
| 3603-C | B5 |
| 3603-D | B5 |
| 3603-E | B5 |
| 3603-F | B5 |
| 3603-G | C5 |
| 3603-H | C5 |
| 3603-I | C5 |
| 3603-J | D5 |
| 3603-K | D5 |
| 3603-L | D5 |
| 3604 | G8 |
| 3605 | G8 |
| 3606 | G8 |
| 3607 | C10 |
| 3608 | F3 |
| 3610 | A4 |
| 3612 | A3 |
| 3613 | A3 |
| 3614 | A2 |
| 3615 | A2 |
| 3616 | A3 |
| 3617 | A2 |
| 3618 | A2 |
| 3621 | B9 |
| 3622 | B9 |
| 3623 | A11 |
| 3624 | A10 |
| 3625 | B10 |
| 3626 | B9 |
| 3627 | C9 |
| 3628 | C9 |
| 3630 | B3 |
| 3631 | B5 |
| 3632 | B3 |
| 3633 | B3 |
| 3634 | B3 |
| 3636 | C3 |
| 3637 | C3 |
| 3640 | D3 |
| 3641 | D3 |
| 3642 | D3 |
| 3650 | G2 |
| 3651 | E1 |
| 3653 | G3 |
| 3654 | D4 |
| 3655 | D4 |
| 3656 | G2 |
| 3657 | E4 |
| 3658 | F2 |
| 3660 | E4 |
| 3661 | E4 |
| 3662 | F4 |
| 3663 | F4 |
| 3664 | G5 |
| 3665 | H5 |
| 3666 | G6 |
| 3667 | G4 |
| 3670 | D10 |
| 3671 | C10 |
| 3674 | D10 |
| 3681 | D11 |
| 3682 | E11 |
| 3683 | E11 |
| 3684 | E9 |
| 3685 | E10 |
| 3686 | E10 |
| 3690 | E8 |
| 3694 | F8 |
| 3695 | F8 |
| 3696 | F8 |
| 3697 | G9 |
| 3698 | G8 |
| 4600 | A7 |
| 4601 | D9 |
| 4602 | D7 |
| 4603 | G8 |
| 4604 | C8 |
| 4605 | D9 |
| 4607 | D9 |
| 4608 | D8 |
| 4616 | B3 |
| 4617 | D10 |
| 5600 | A8 |
| 5601 | A9 |
| 5603 | G9 |
| 5620 | A10 |
| 6600 | A8 |
| 6610 | A3 |
| 6650 | F2 |
| 6653 | F2 |
| 6661 | G4 |
| 6663 | G3 |
| 6690 | E9 |
| 6691 | F9 |
| 6692 | F9 |
| 6693 | F9 |
| 7600 | B6 |
| 7603 | D10 |
| 7608 | F3 |
| 7610 | A4 |
| 7620 | A11 |
| 7650 | F2 |
| 7651 | E2 |
| 7681 | E10 |
| 7682 | E10 |
| 9610 | E9 |
| 9611 | E9 |
| 9612 | F9 |
| 9613 | F9 |
| 9614 | F4 |
| 9615 | G4 |
| 9616 | A10 |
| IM30 | G11 |
| IM32 | G2 |
| IM33 | C12 |
| IM37 | G11 |
| IM38 | C9 |

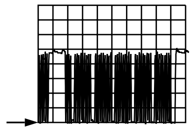
C1 5.0V DC

C2



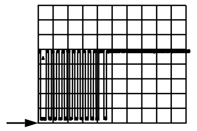
1V / div DC
0.1ms / div

C3



1V / div DC
0.1ms / div

C4



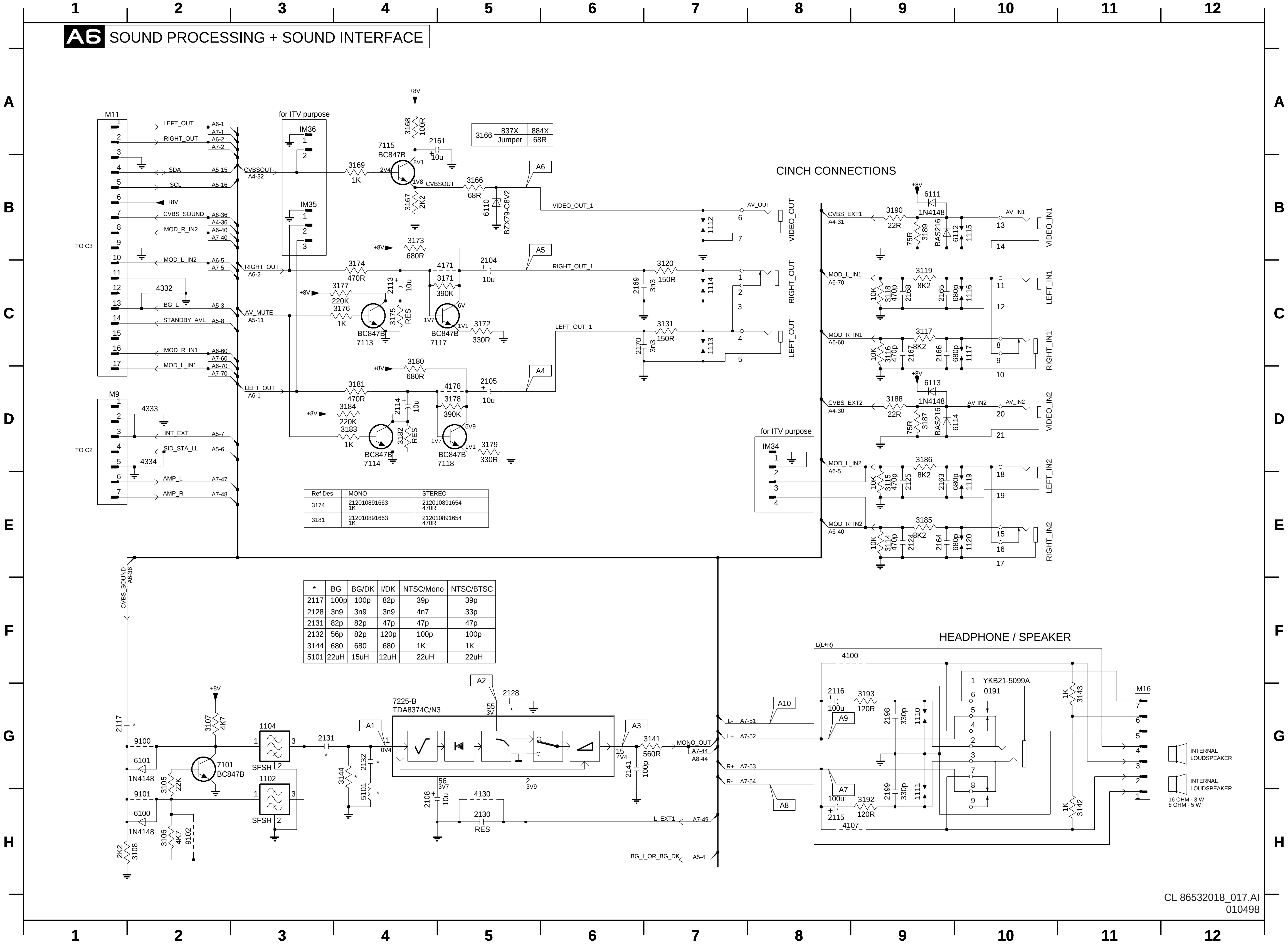
1V/ div DC
5ms / div

C5 3V tt 12 MHz

C6 5V tt 12 MHz

CL 86532018_006.AI
020498

## A6 SOUND PROCESSING + SOUND INTERFACE

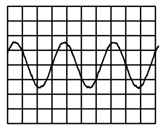

1 2 3 4 5 6 7 8 9 10 11 12
A B C D E F G H
M11
TO C3
LEFT_OUT
RIGHT_OUT
SDA
SCL
+8V
CVBS_SOUND
MOD_R_IN2
MOD_L_IN2
BG_L
STANDBY_AVL
MOD_R_IN1
MOD_L_IN1
4332
M9
TO C2
4333
INT_EXT
SID_STA_LL
4334
AMP_L
AMP_R
for ITV purpose
IM36
IM35
CVBSOUT
RIGHT_OUT
AV_MUTE
LEFT_OUT
7115
BC847B
3168 100R
2161 10u
3169 1K
3167 2K2
CVBSOUT
3166 68R
6110 BZX79-C8V2
3166 837X 884X Jumper 68R
A6
VIDEO_OUT_1
3173 680R
3174 470R
4171
3171 390K
2104 10u
A5
RIGHT_OUT_1
3177 220K
3176 1K
2113 10u
3175 RES
BC847B 7113
BC847B 7117
3172 330R
LEFT_OUT_1
3180 680R
3181 470R
4178
3178 390K
2105 10u
A4
3184 220K
3183 1K
2114 10u
3182 RES
BC847B 7114
BC847B 7118
3179 330R
CINCH CONNECTIONS
AV_OUT
1112
VIDEO_OUT
2169 3n3
3120 150R
1114
RIGHT_OUT
2170 3n3
3131 150R
1113
LEFT_OUT
for ITV purpose
IM34
CVBS_EXT1
3190 22R
6111 1N4148
3189 75R
BAS216 6112
1115
AV_IN1
VIDEO_IN1
MOD_L_IN1
3118 10K
2168 470p
3119 8K2
2165 680p
1116
LEFT_IN1
MOD_R_IN1
3116 10K
2167 470p
3117 8K2
2166 680p
1117
RIGHT_IN1
CVBS_EXT2
3188 22R
6113 1N4148
3187 75R
BAS216 6114
AV-IN2
AV_IN2
VIDEO_IN2
MOD_L_IN2
3115 10K
2125 470p
3186 8K2
2163 680p
1119
LEFT_IN2
MOD_R_IN2
3114 10K
2124 470p
3185 8K2
2164 680p
1120
RIGHT_IN2
CVBS_SOUND
2117
9100
6101 1N4148
9101
6100 1N4148
3108 2K2
3107 4K7
7101 BC847B
3105 22K
3106 4K7
9102
1104 SFSH
1102 SFSH
2131
3144
2132
5101
A1
A2
2128
7225-B
TDA8374C/N3
55 3V
56 3V7
2108 10u
4130
2130 RES
A3
3141 560R
2141 100p
MONO_OUT
L_EXT1
BG_I_OR_BG_DK
HEADPHONE / SPEAKER
L(L+R)
4100
A10
2116 10u
3193 120R
2198 330p
1110
A9
YKB21-5099A
0191
A7
2115 100u
3192 120R
2199 330p
1111
4107
A8
1K 3143
1K 3142
M16
INTERNAL LOUDSPEAKER
INTERNAL LOUDSPEAKER
16 OHM - 3 W
8 OHM - 5 W
CL 86532018_017.AI
010498

| Ref Des | MONO | STEREO |
|---|---|---|
| 3174 | 212010891663<br>1K | 212010891654<br>470R |
| 3181 | 212010891663<br>1K | 212010891654<br>470R |

| * | BG | BG/DK | I/DK | NTSC/Mono | NTSC/BTSC |
|---|---|---|---|---|---|
| 2117 | 100p | 100p | 82p | 39p | 39p |
| 2128 | 3n9 | 3n9 | 3n9 | 4n7 | 33p |
| 2131 | 82p | 82p | 47p | 47p | 47p |
| 2132 | 56p | 82p | 120p | 100p | 100p |
| 3144 | 680 | 680 | 680 | 1K | 1K |
| 5101 | 22uH | 15uH | 12uH | 22uH | 22uH |

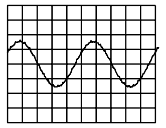
**M9 D1**
**M11 A1**
**M16 G11**
**0191 G10**
**1102 G3**
**1104 G3**
**1110 G9**
**1111 H9**
**1112 B7**
**1113 C7**
**1114 C7**
**1115 B10**
**1116 C10**
**1117 C10**
**1119 E10**
**1120 E10**
**2104 C5**
**2105 D5**
**2108 H4**
**2113 C4**
**2114 D4**
**2115 H8**
**2116 G8**
**2117 G1**
**2124 E9**
**2125 E9**
**2128 G5**
**2130 H5**
**2131 G3**
**2132 G4**
**2141 G6**
**2161 A4**
**2163 E9**
**2164 E9**
**2165 C9**
**2166 C9**
**2167 C9**
**2168 C9**
**2169 C6**
**2170 C6**
**2198 G9**
**2199 H9**
**3105 G2**
**3106 H2**
**3107 G2**
**3108 H2**
**3114 E9**
**3115 E9**
**3116 C9**
**3117 C9**
**3118 C9**
**3119 C9**
**3120 C7**
**3131 C7**
**3141 G7**
**3142 H11**
**3143 G11**
**3144 G4**
**3166 B5**
**3167 B4**
**3168 A4**
**3169 B4**
**3171 C5**
**3172 C5**
**3173 B4**
**3174 C4**
**3175 C4**
**3176 C4**
**3177 C4**
**3178 D5**
**3179 D5**
**3180 C4**
**3181 D4**
**3182 D4**
**3183 D4**
**3184 D4**
**3185 E9**
**3186 D9**
**3187 D9**
**3188 D9**
**3189 B9**
**3190 B9**
**3192 H9**
**3193 G9**
**4100 F8**
**4107 H8**
**4130 H5**
**4171 C5**
**4178 D5**
**4332 C2**
**4333 D2**
**4334 D2**
**5101 H4**
**6100 H2**
**6101 G2**
**6110 B5**
**6111 B9**
**6112 B9**
**6113 D9**
**6114 D9**
**7101 G2**
**7113 C4**
**7114 D4**
**7115 A4**
**7117 C4**
**7118 D5**
**7225-B G4**
**9100 G2**
**9101 H2**
**9102 H2**
**IM34 D8**
**IM35 B3**
**IM36 A3**
**M27-A C8**
**M27-B B8**
**M27-C C10**
**M27-D B10**
**M27-E E10**
**M27-F D10**
**M27-G C8**
**M27-H D10**
**M27-I E10**

A4



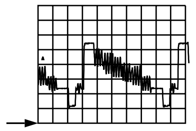
0.5V / div AC
0.1ms / div

A5



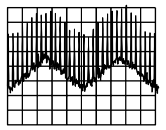
0.5V / div AC
0.2ms / div

A6



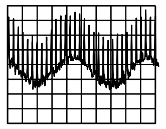
5V / div DC
10ms / div

A7



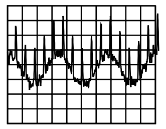
50mV / div AC
0.2ms / div

A8



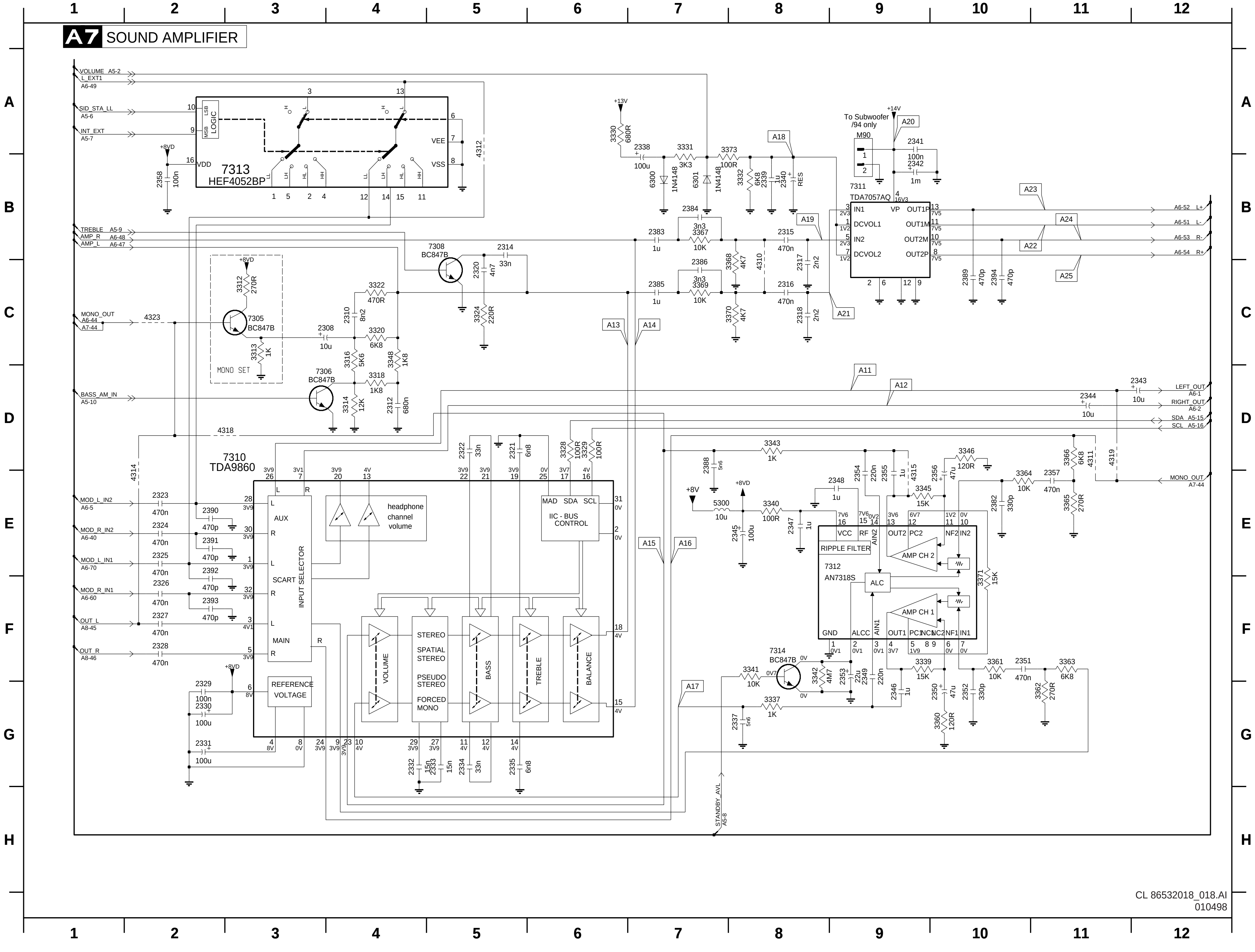
50mV / div AC
0.2ms / div

A9



50mV / div AC
0.1ms / div

CL 86532018_007.AI
020498

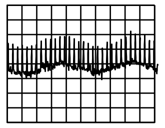

A7 SOUND AMPLIFIER
1 2 3 4 5 6 7 8 9 10 11 12
A B C D E F G H
VOLUME A5-2
L_EXT1 A6-49
SID_STA_LL A5-6
INT_EXT A5-7
TREBLE A5-9
AMP_R A6-48
AMP_L A6-47
MONO_OUT A6-44
A7-44
BASS_AM_IN A5-10
MOD_L_IN2 A6-5
MOD_R_IN2 A6-40
MOD_L_IN1 A6-70
MOD_R_IN1 A6-60
OUT_L A8-45
OUT_R A8-46
7313
HEF4052BP
LOGIC
VDD
VEE
VSS
7305 BC847B
7306 BC847B
7308 BC847B
MONO SET
7310
TDA9860
AUX
SCART
MAIN
INPUT SELECTOR
headphone channel volume
IIC - BUS CONTROL
MAD SDA SCL
REFERENCE VOLTAGE
VOLUME
STEREO
SPATIAL STEREO
PSEUDO STEREO
FORCED MONO
BASS
TREBLE
BALANCE
7311
TDA7057AQ
IN1 VP OUT1P
DCVOL1 OUT1M
IN2 OUT2M
DCVOL2 OUT2P
To Subwoofer /94 only
M90
+13V
+14V
+8VD
+8V
A6-52 L+
A6-51 L-
A6-53 R-
A6-54 R+
LEFT_OUT A6-1
RIGHT_OUT A6-2
SDA A5-15
SCL A5-16
MONO_OUT A7-44
7312
AN7318S
RIPPLE FILTER
VCC RF
OUT2 PC2
NF2 IN2
AMP CH 2
AMP CH 1
ALC
GND ALCC AIN1 OUT1 PC1 NC1 NC2 NF1 IN1
7314 BC847B
STANDBY_AVL A5-8
A11 A12 A13 A14 A15 A16 A17 A18 A19 A20 A21 A22 A23 A24 A25
CL 86532018_018.AI
010498

|  |  |
|---|---|
| M90 | A9 |
| 2308 | C3 |
| 2310 | C4 |
| 2312 | D4 |
| 2314 | B5 |
| 2315 | B8 |
| 2316 | C8 |
| 2317 | C8 |
| 2318 | C8 |
| 2320 | C5 |
| 2321 | D5 |
| 2322 | D5 |
| 2323 | E2 |
| 2324 | E2 |
| 2325 | E2 |
| 2326 | F2 |
| 2327 | F2 |
| 2328 | F2 |
| 2329 | G2 |
| 2330 | G2 |
| 2331 | G2 |
| 2332 | G4 |
| 2333 | G5 |
| 2334 | G5 |
| 2335 | G5 |
| 2337 | G8 |
| 2338 | A7 |
| 2339 | B8 |
| 2340 | B8 |
| 2341 | A9 |
| 2342 | B9 |
| 2343 | D12 |
| 2344 | D11 |
| 2345 | E8 |
| 2346 | G9 |
| 2347 | E8 |
| 2348 | E9 |
| 2349 | F9 |
| 2350 | G10 |
| 2351 | F10 |
| 2352 | G10 |
| 2353 | F9 |
| 2354 | E9 |
| 2355 | E9 |
| 2356 | E10 |
| 2357 | E11 |
| 2358 | B2 |
| 2382 | E10 |
| 2383 | B7 |
| 2384 | B7 |
| 2385 | C7 |
| 2386 | C7 |
| 2388 | D7 |
| 2389 | C10 |
| 2390 | E2 |
| 2391 | E2 |
| 2392 | E2 |
| 2393 | F2 |
| 2394 | C10 |
| 3312 | C3 |
| 3313 | C3 |
| 3314 | D4 |
| 3316 | C4 |
| 3318 | D4 |
| 3320 | C4 |
| 3322 | C4 |
| 3324 | C5 |
| 3328 | D6 |
| 3329 | D6 |
| 3330 | A6 |
| 3331 | A7 |
| 3332 | B8 |
| 3337 | G8 |
| 3339 | F9 |
| 3340 | E8 |
| 3341 | F8 |
| 3342 | F8 |
| 3343 | D8 |
| 3345 | E9 |
| 3346 | D10 |
| 3348 | C4 |
| 3360 | G10 |
| 3361 | F10 |
| 3362 | G11 |
| 3363 | F11 |
| 3364 | E10 |
| 3365 | E11 |
| 3366 | D11 |
| 3367 | B7 |
| 3368 | C8 |
| 3369 | C7 |
| 3370 | C8 |
| 3371 | F10 |
| 3373 | A8 |
| 4310 | C8 |
| 4311 | D11 |
| 4312 | A5 |
| 4314 | E2 |
| 4315 | E9 |
| 4318 | D3 |
| 4319 | D11 |
| 4323 | C2 |
| 5300 | E7 |
| 6300 | B7 |
| 6301 | B7 |
| 7305 | C3 |
| 7306 | D3 |
| 7308 | B5 |
| 7310 | D3 |
| 7311 | B9 |
| 7312 | E8 |
| 7313 | B2 |
| 7314 | F8 |

A18 ◀) 1.2V DC

A18 🔇 0V DC

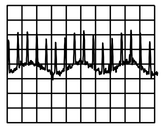
A19



50mV / div AC
0.2ms / div

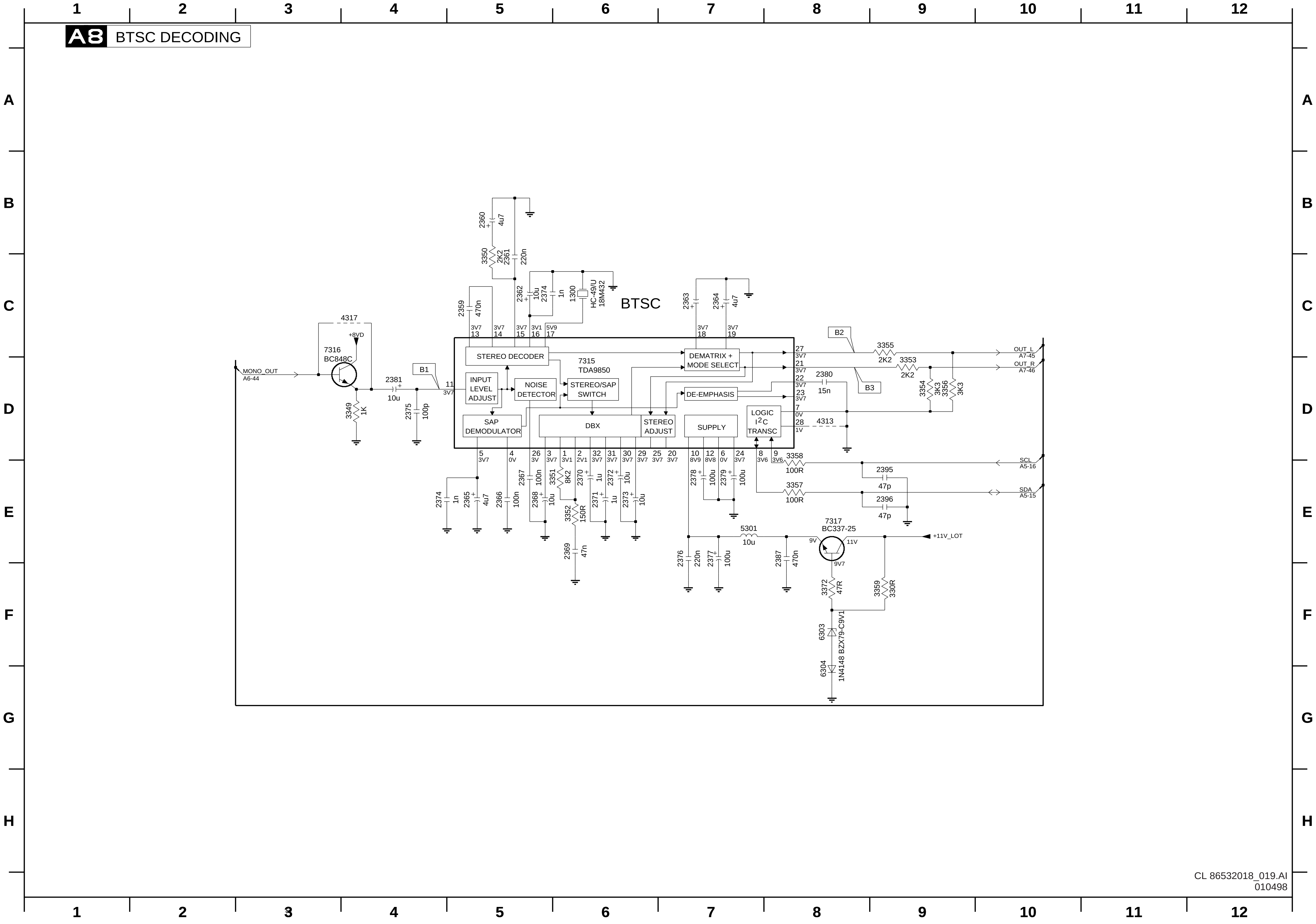
A20 14.8V DC

A21

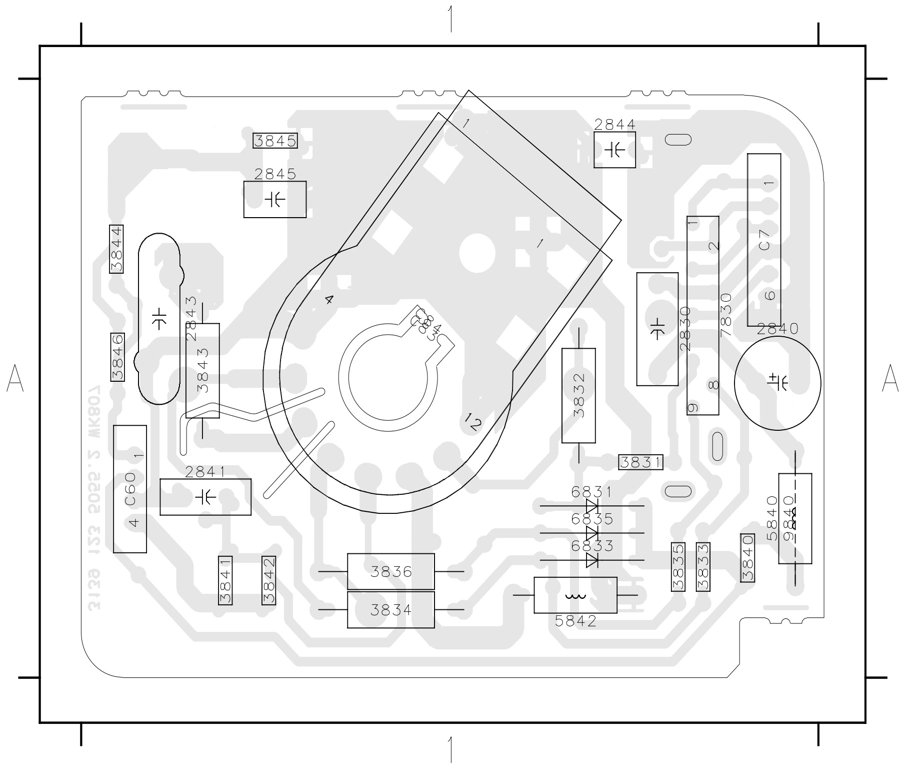


50mV / div AC
0.1ms / div

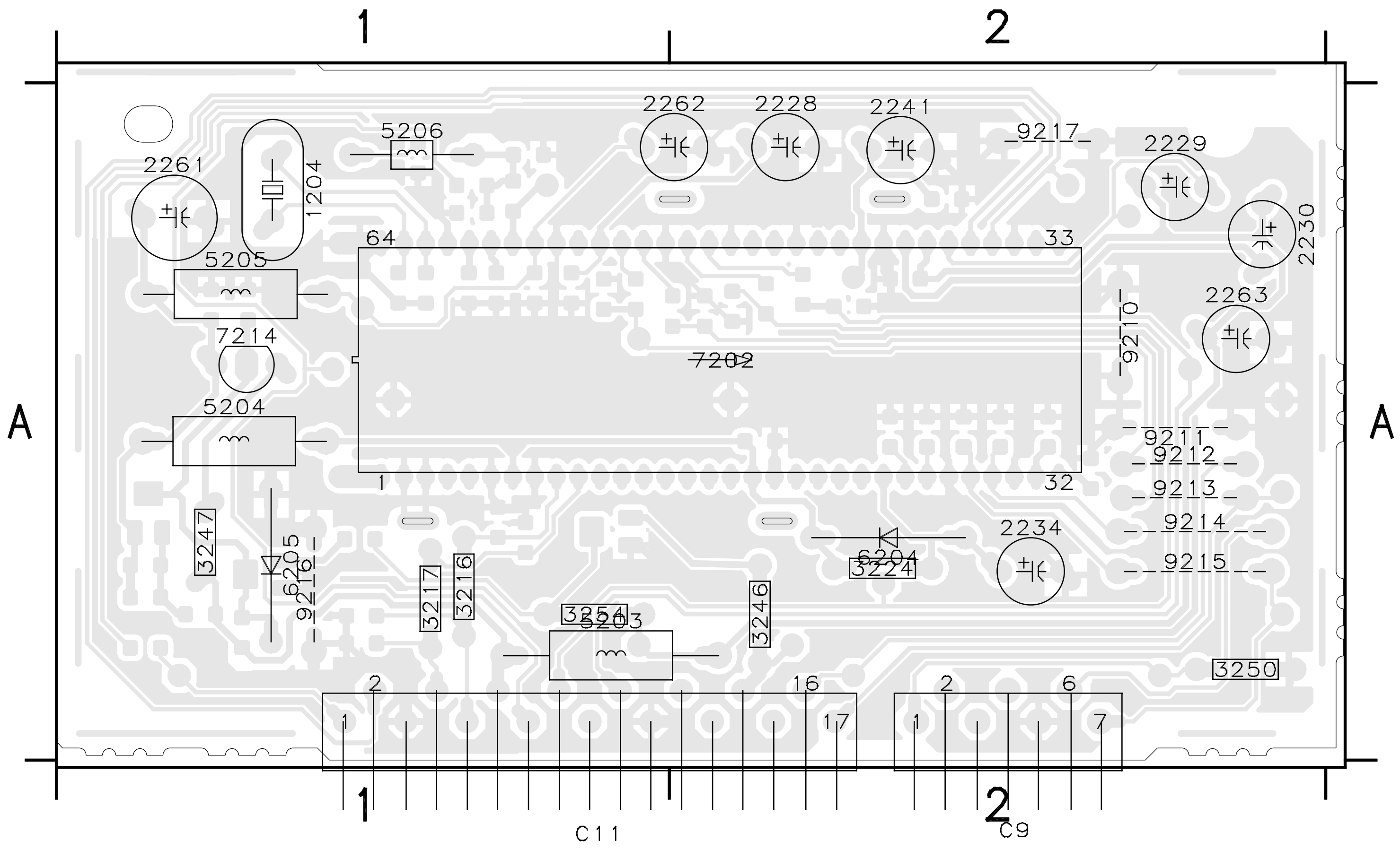
CL 86532018_008.AI
270398


A8 BTSC DECODING
1 2 3 4 5 6 7 8 9 10 11 12
A B C D E F G H
BTSC
7315
TDA9850
STEREO DECODER
INPUT LEVEL ADJUST
NOISE DETECTOR
STEREO/SAP SWITCH
DEMATRIX + MODE SELECT
DE-EMPHASIS
SAP DEMODULATOR
DBX
STEREO ADJUST
SUPPLY
LOGIC I2C TRANSC
7316
BC848C
4317
+8VD
MONO_OUT
A6-44
3349
1K
2381
10u
2375
100p
B1
B2
B3
2359
470n
3350
2K2
2360
4u7
2361
220n
2362
10u
2374
1n
1300
HC-49/U
18M432
2363
2364
4u7
3355
2K2
3353
2K2
2380
15n
3354
3K3
3356
3K3
4313
OUT_L
A7-45
OUT_R
A7-46
SCL
A5-16
SDA
A5-15
3358
100R
3357
100R
2395
47p
2396
47p
2365
4u7
2366
100n
2367
100n
2368
10u
3351
8K2
3352
150R
2369
47n
2370
1u
2371
1u
2372
10u
2373
10u
2378
100u
2379
100u
2376
220n
2377
100u
5301
10u
2387
470n
7317
BC337-25
+11V_LOT
3372
47R
3359
330R
6303
BZX79-C9V1
6304
1N4148
4u7
CL 86532018_019.AI
010498

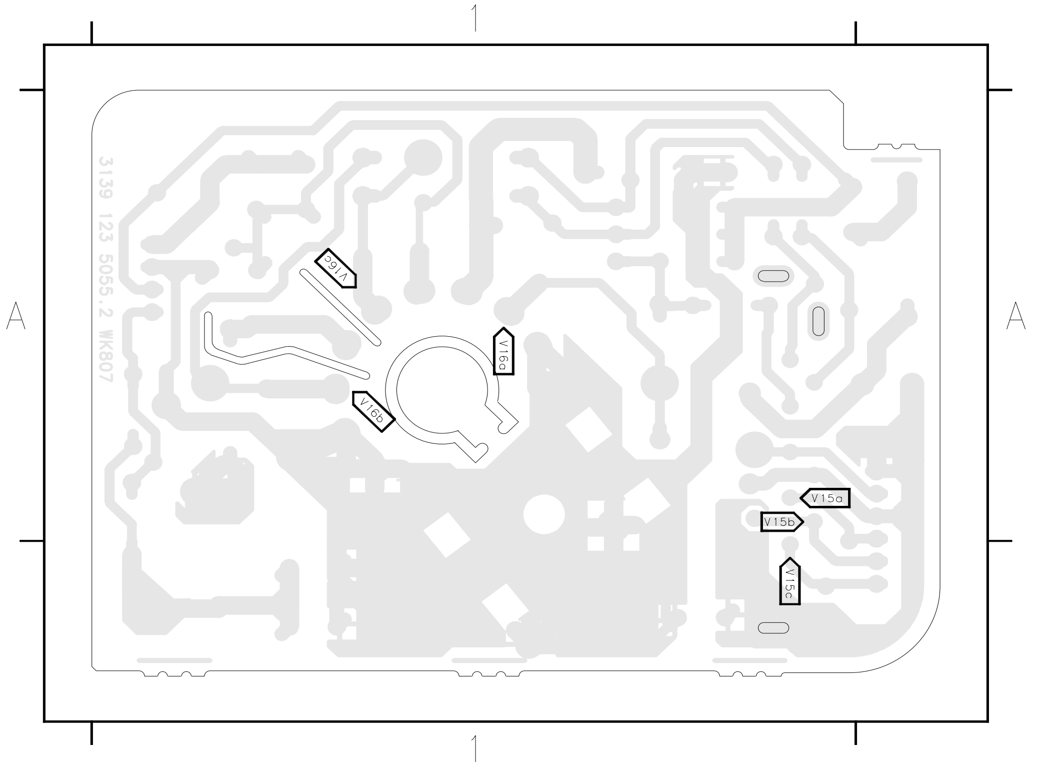
| | |
|---|---|
| 1300 | C6 |
| 2359 | C5 |
| 2360 | B5 |
| 2361 | C5 |
| 2362 | C5 |
| 2363 | C7 |
| 2364 | C7 |
| 2365 | E5 |
| 2366 | E5 |
| 2367 | E5 |
| 2368 | E5 |
| 2369 | E6 |
| 2370 | E6 |
| 2371 | E6 |
| 2372 | E6 |
| 2373 | E6 |
| 2374 | E4 |
| 2374 | C5 |
| 2375 | D4 |
| 2376 | E7 |
| 2377 | E7 |
| 2378 | E7 |
| 2379 | E7 |
| 2380 | D8 |
| 2381 | D4 |
| 2387 | E8 |
| 2395 | E9 |
| 2396 | E9 |
| 3349 | D4 |
| 3350 | C5 |
| 3351 | E6 |
| 3352 | E6 |
| 3353 | D9 |
| 3354 | D9 |
| 3355 | C9 |
| 3356 | D9 |
| 3357 | E8 |
| 3358 | D8 |
| 3359 | F9 |
| 3372 | F8 |
| 4313 | D8 |
| 4317 | C4 |
| 5301 | E7 |
| 6303 | F8 |
| 6304 | G8 |
| 7315 | D6 |
| 7316 | C3 |
| 7317 | E8 |

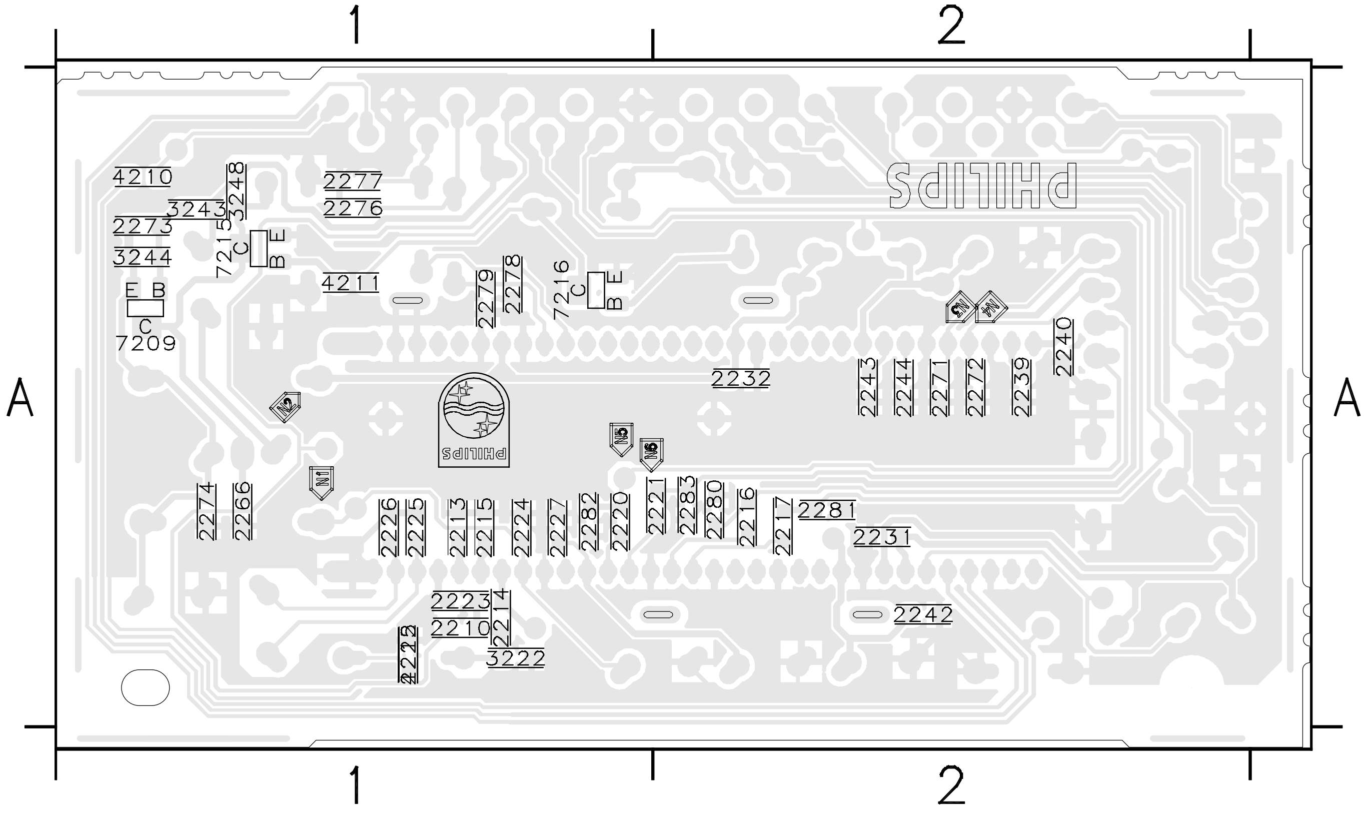

1
A
3845
2845
2844
3844
3846
2843
3843
C60
2841
3841
3842
3836
3834
5842
3832
3831
6831
6835
6833
3835
3833
3840
5840
9840
2830
7830
C7
2840

| | |
|---|---|
| C7 | A1 |
| C60 | A1 |
| C83 | A1 |
| C84 | A1 |
| 2830 | A1 |
| 2840 | A1 |
| 2841 | A1 |
| 2843 | A1 |
| 2844 | A1 |
| 2845 | A1 |
| 3831 | A1 |
| 3832 | A1 |
| 3833 | A1 |
| 3834 | A1 |
| 3835 | A1 |
| 3836 | A1 |
| 3840 | A1 |
| 3841 | A1 |
| 3842 | A1 |
| 3843 | A1 |
| 3844 | A1 |
| 3845 | A1 |
| 3846 | A1 |
| 5840 | A1 |
| 5842 | A1 |
| 6831 | A1 |
| 6833 | A1 |
| 6835 | A1 |
| 7830 | A1 |
| 9840 | A1 |

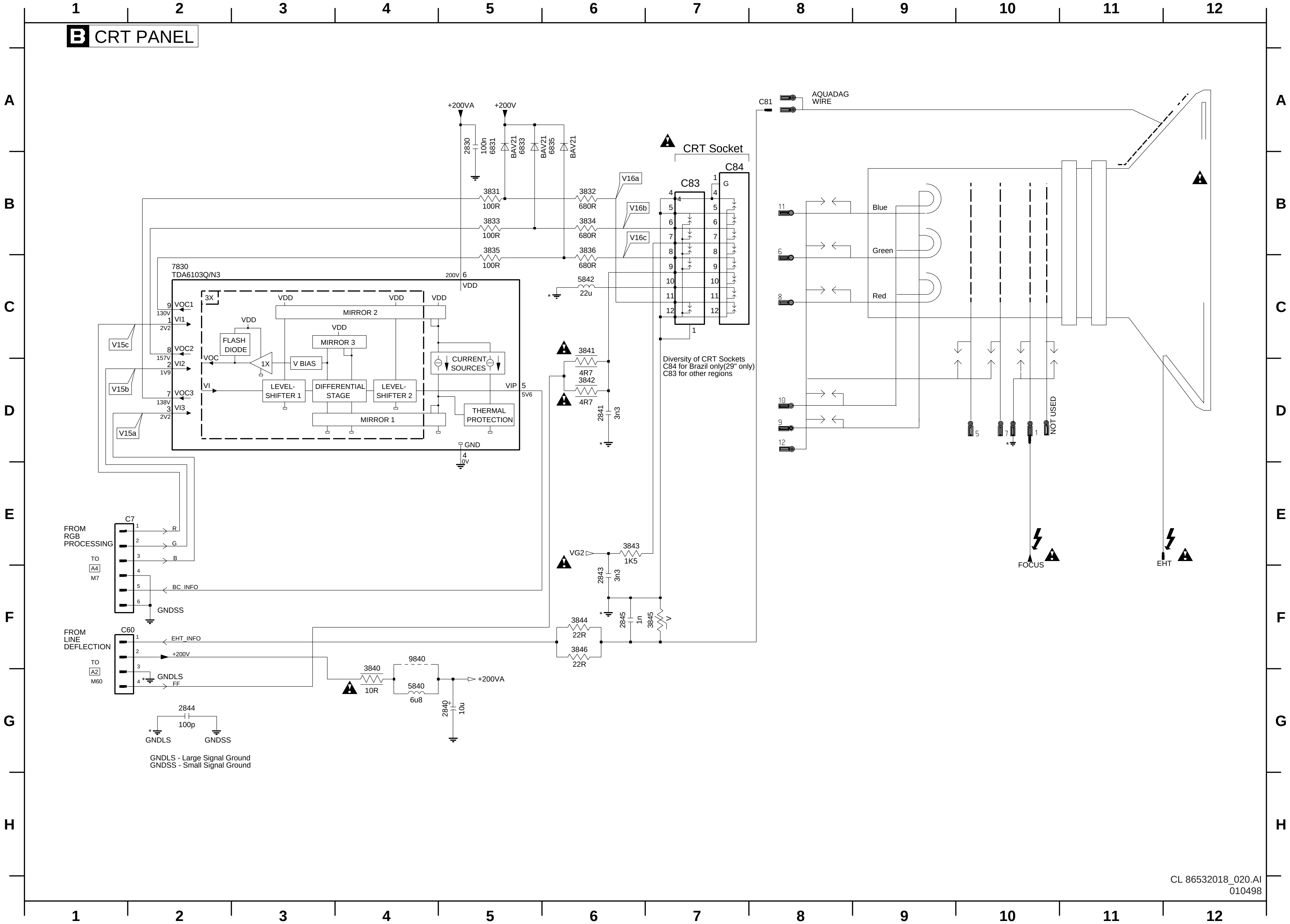

1
2
A
2261
1204
5206
2262
2228
2241
9217
2229
2230
64
33
5205
7214
7202
9210
2263
5204
32
9211
9212
9213
9214
9215
3247
6205
9216
3217
3216
3254
5203
3246
6204
3224
2234
3250
16
17
6
7
C11
C9

| | |
|---|---|
| C9 | A2 |
| C11 | A1 |
| 1204 | A1 |
| 2228 | A2 |
| 2229 | A2 |
| 2230 | A2 |
| 2234 | A2 |
| 2241 | A2 |
| 2261 | A1 |
| 2262 | A2 |
| 2263 | A2 |
| 3216 | A1 |
| 3217 | A1 |
| 3224 | A2 |
| 3246 | A2 |
| 3247 | A1 |
| 3250 | A2 |
| 3254 | A1 |
| 5203 | A2 |
| 5204 | A1 |
| 5205 | A1 |
| 5206 | A1 |
| 6204 | A2 |
| 6205 | A1 |
| 7202 | A1 |
| 7214 | A1 |
| 9210 | A2 |
| 9211 | A2 |
| 9212 | A2 |
| 9213 | A2 |
| 9214 | A2 |
| 9215 | A2 |
| 9216 | A1 |
| 9217 | A2 |


1
A
3139 123 5055.2 WK807
V15a
V15b
V15c

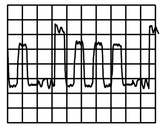

1
2
A
PHILIPS
4210
2273
3243
3248
3244
7215
C
B
E
7209
2277
2276
4211
2279
2278
7216
2232
2243
2244
2271
2272
2239
2240
2274
2266
2226
2225
2213
2215
2224
2227
2282
2220
2221
2283
2280
2216
2217
2281
2231
2242
2223
2214
2210
2222
3222

| | | | |
|---|---|---|---|
| 2210 | A1 | 3222 | A1 |
| 2213 | A1 | 3243 | A1 |
| 2214 | A1 | 3244 | A1 |
| 2215 | A1 | 3248 | A1 |
| 2216 | A2 | 4210 | A1 |
| 2217 | A2 | 4211 | A1 |
| 2220 | A1 | 4215 | A1 |
| 2221 | A2 | 7209 | A1 |
| 2222 | A1 | 7215 | A1 |
| 2223 | A1 | 7216 | A1 |
| 2224 | A1 | | |
| 2225 | A1 | | |
| 2226 | A1 | | |
| 2227 | A1 | | |
| 2231 | A2 | | |
| 2232 | A2 | | |
| 2239 | A2 | | |
| 2240 | A2 | | |
| 2242 | A2 | | |
| 2243 | A2 | | |
| 2244 | A2 | | |
| 2266 | A1 | | |
| 2271 | A2 | | |
| 2272 | A2 | | |
| 2273 | A1 | | |
| 2274 | A1 | | |
| 2276 | A1 | | |
| 2277 | A1 | | |
| 2278 | A1 | | |
| 2279 | A1 | | |
| 2280 | A2 | | |
| 2281 | A2 | | |
| 2282 | A1 | | |
| 2283 | A2 | | |


B CRT PANEL
1
2
3
4
5
6
7
8
9
10
11
12
A
B
C
D
E
F
G
H
+200VA
+200V
2830
100n
6831
BAV21
6833
BAV21
6835
BAV21
CRT Socket
C83
C84
G
C81
AQUADAG
WIRE
V16a
V16b
V16c
3831
100R
3832
680R
3833
100R
3834
680R
3835
100R
3836
680R
5842
22u
7830
TDA6103Q/N3
200V 6
VDD
3X
MIRROR 2
MIRROR 3
MIRROR 1
FLASH
DIODE
1X
V BIAS
CURRENT
SOURCES
LEVEL-
SHIFTER 1
DIFFERENTIAL
STAGE
LEVEL-
SHIFTER 2
THERMAL
PROTECTION
9 VOC1
130V
1 VI1
2V2
8 VOC2
157V
2 VI2
1V9
7 VOC3
138V
3 VI3
2V2
VOC
VI
VIP 5
5V6
GND
4
0V
V15c
V15b
V15a
3841
4R7
3842
4R7
2841
3n3
Diversity of CRT Sockets
C84 for Brazil only(29" only)
C83 for other regions
Blue
Green
Red
NOT USED
11
6
8
10
9
12
5
7
1
FOCUS
EHT
FROM
RGB
PROCESSING
C7
TO
A4
M7
R
G
B
BC_INFO
GNDSS
FROM
LINE
DEFLECTION
C60
TO
A2
M60
EHT_INFO
+200V
GNDLS
FF
2844
100p
GNDLS
GNDSS
GNDLS - Large Signal Ground
GNDSS - Small Signal Ground
VG2
3843
1K5
2843
3n3
2845
1n
3845
3844
22R
3846
22R
3840
10R
9840
5840
6u8
2840
10u
+200VA
CL 86532018_020.AI
010498

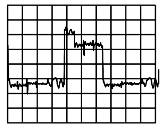
| | |
|---|---|
| C7 | E2 |
| C60 | F2 |
| C81 | A8 |
| C83 | B7 |
| C84 | B7 |
| 2830 | A5 |
| 2840 | G5 |
| 2841 | D6 |
| 2843 | F6 |
| 2844 | G2 |
| 2845 | F6 |
| 3831 | B5 |
| 3832 | B6 |
| 3833 | B5 |
| 3834 | B6 |
| 3835 | B5 |
| 3836 | B6 |
| 3840 | G4 |
| 3841 | C6 |
| 3842 | D6 |
| 3843 | E6 |
| 3844 | F6 |
| 3845 | F7 |
| 3846 | F6 |
| 5840 | G4 |
| 5842 | C6 |
| 6831 | A5 |
| 6833 | A5 |
| 6835 | A6 |
| 7830 | C2 |
| 9840 | F4 |

V15a



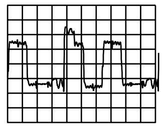
500mV / div AC
10µs / div

V15b



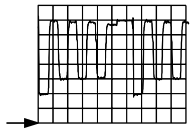
500mV / div AC
10µs / div

V15c



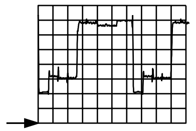
500mV / div AC
10µs / div

V16a



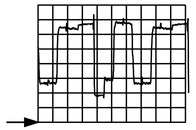
20V / div DC
10µs / div

V16b



20V / div DC
10µs / div

V16c



20V / div DC
10µs / div

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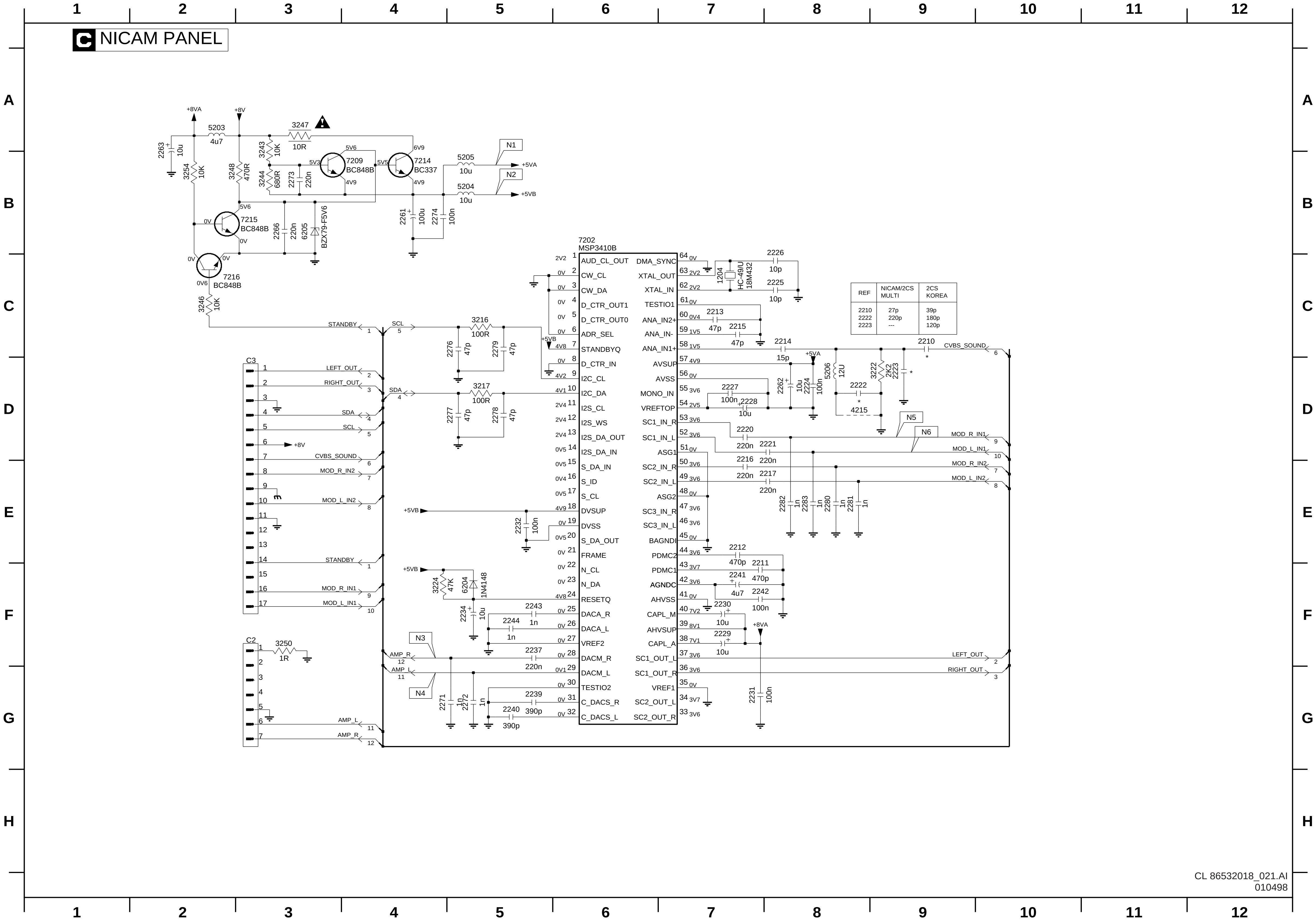
C NICAM PANEL
1 2 3 4 5 6 7 8 9 10 11 12
A B C D E F G H
7202
MSP3410B
AUD_CL_OUT
CW_CL
CW_DA
D_CTR_OUT1
D_CTR_OUT0
ADR_SEL
STANDBYQ
D_CTR_IN
I2C_CL
I2C_DA
I2S_CL
I2S_WS
I2S_DA_OUT
I2S_DA_IN
S_DA_IN
S_ID
S_CL
DVSUP
DVSS
S_DA_OUT
FRAME
N_CL
N_DA
RESETQ
DACA_R
DACA_L
VREF2
DACM_R
DACM_L
TESTIO2
C_DACS_R
C_DACS_L
DMA_SYNC
XTAL_OUT
XTAL_IN
TESTIO1
ANA_IN2+
ANA_IN-
ANA_IN1+
AVSUP
AVSS
MONO_IN
VREFTOP
SC1_IN_R
SC1_IN_L
ASG1
SC2_IN_R
SC2_IN_L
ASG2
SC3_IN_R
SC3_IN_L
BAGNDI
PDMC2
PDMC1
AGNDC
AHVSS
CAPL_M
AHVSUP
CAPL_A
SC1_OUT_L
SC1_OUT_R
VREF1
SC2_OUT_L
SC2_OUT_R
+8VA
+8V
5203 4u7
3247 10R
3243 10K
3244 680R
3248 470R
3254 10K
2263 10u
2273 220n
2266 220n
6205 BZX79-F5V6
7209 BC848B
7214 BC337
7215 BC848B
7216 BC848B
3246 10K
5205 10u
5204 10u
2261 100u
2274 100n
N1
N2
+5VA
+5VB
1204 HC-49U 18M432
2226 10p
2225 10p
2213 47p
2215 47p
2214 15p
2210
5206 12U
3222 2K2
2223
2222
4215
2262 10u
2224 100n
2227 100n
2228 10u
2220 220n
2221 220n
2216 220n
2217 220n
2282 1n
2283 1n
2280 1n
2281 1n
2212 470p
2211 470p
2241 4u7
2242 100n
2230 10u
2229 10u
2231 100n
3216 100R
3217 100R
2276 47p
2279 47p
2277 47p
2278 47p
2232 100n
3224 47K
6204 1N4148
2234 10u
2243 1n
2244 1n
2237 220n
2239 390p
2240 390p
2271 1n
2272 1n
N3
N4
N5
N6
C3
C2
3250 1R
LEFT_OUT
RIGHT_OUT
SDA
SCL
CVBS_SOUND
MOD_R_IN2
MOD_L_IN2
STANDBY
MOD_R_IN1
MOD_L_IN1
AMP_L
AMP_R
CL 86532018_021.AI
010498

| REF | NICAM/2CS MULTI | 2CS KOREA |
|---|---|---|
| 2210 | 27p | 39p |
| 2222 | 220p | 180p |
| 2223 | --- | 120p |

| | |
|---|---|
| C2 | F3 |
| C3 | D3 |
| 1204 | C7 |
| 2210 | C9 |
| 2211 | F7 |
| 2212 | E7 |
| 2213 | C7 |
| 2214 | C8 |
| 2215 | C7 |
| 2216 | E7 |
| 2217 | E8 |
| 2220 | D7 |
| 2221 | D8 |
| 2222 | D8 |
| 2223 | D9 |
| 2224 | D8 |
| 2225 | C8 |
| 2226 | C8 |
| 2227 | D7 |
| 2228 | D7 |
| 2229 | F7 |
| 2230 | F7 |
| 2231 | G7 |
| 2232 | E5 |
| 2234 | F5 |
| 2237 | F5 |
| 2239 | G5 |
| 2240 | G5 |
| 2241 | F7 |
| 2242 | F7 |
| 2243 | F5 |
| 2244 | F5 |
| 2261 | B4 |
| 2262 | D8 |
| 2263 | A2 |
| 2266 | B3 |
| 2271 | G4 |
| 2272 | G5 |
| 2273 | B3 |
| 2274 | B4 |
| 2276 | C5 |
| 2277 | D5 |
| 2278 | D5 |
| 2279 | C5 |
| 2280 | E8 |
| 2281 | E8 |
| 2282 | E8 |
| 2283 | E8 |
| 3216 | C5 |
| 3217 | D5 |
| 3222 | D9 |
| 3224 | F4 |
| 3243 | A3 |
| 3244 | B3 |
| 3246 | C2 |
| 3247 | A3 |
| 3248 | B2 |
| 3250 | F3 |
| 3254 | B2 |
| 4215 | D8 |
| 5203 | A2 |
| 5204 | B5 |
| 5205 | B5 |
| 5206 | D8 |
| 6204 | F5 |
| 6205 | B3 |
| 7202 | B6 |
| 7209 | B4 |
| 7214 | B4 |
| 7215 | B3 |
| 7216 | C3 |

| | |
|---|---|
| N1 | 4.1V DC |
| N2 | 4.2V DC |
| N3 | 0.2ms AC |

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# 8 Electrical adjustments

Notes :
Unless stated otherwise, the supply voltage used is :

- 220v to 240v +/- 10%, 50 - 60 Hz +/- 5%.
- Voltage and oscillograms are measured in relation to earth.
- Never use a heatsink as earth.

For the adjustments a colour pattern generator PM5418 has been used. Pattern generator type PM5193 (optional) .

## 8.1 Settings on the carrier panel

### *8.1.1 + 140 V supply voltage for 25" and 29" picture tubes.*

Connect a multimeter (DC) across C2551. Set brightness at mid position and contrast at maximum. Apply a pattern generator with a colour bar. Adjust potentiometer R3572 to 140 Volts +/- 1 V DC.

### *8.1.2 Geometry adjustments (software adjustment)*

Set pattern generator (e.g. PM5418) with colour bar pattern and connect to aerial input with RF signal amplitude - 1mv. Enter SAM mode byusing the Dealer Service Tool or short-circuit service pins M28 and M29 on PCB and switch power "ON". The menu is displayed whenever SAM mode is entered.

Enter into GEOMETRY menu.

- Vertical Amplitude and position
  - Select item VSH and set vertical shift to 31 (Nominal value !!).
  - Select item VAM and align the top of the screen with vertical amplitude.
  - Select item VSL and align the bottom of the screen with vertical slope.

- Horizontal Amplitude and phase
  - Select item HSH and align horizontal shift until picture to center of the screen.
  - Select item EW and align the picture width (only those sets with East-West drive circuit).
  - Select item PW and align East-West parabola for straight vertical lines.
  - Select item TC and align east-west trapezium for a rectangle.
  - Repeat if necessary.

General :

The value can be increment or decrement by pressing the user remote control right or left key. The results of the picture will change according to the selected item.

### *8.1.3 Focusing*

Set pattern generator (e.g. PM5418) with colour bar pattern and connect to aerial input with RF signal amplitude of 1mv. Set brightness and contrast at maximum. Adjusted with focusing potentiometer (upper hole of LOT 5445 ) for maximum sharpness of the picture.

### *8.1.4 IF-PLL / RF AGC adjustment (software adjustment)*

Set generator (e.g. PM5418) with colour bar pattern and set frequency for PAL to 189.25MHz and for NTSC 55.25MHz with RF signal amplitudeof 3mv (70dBuv) and connect this signal to the aerial input.

Enter SAM mode by Dealer Service Tool or short-circuit service pins M28 and M29 on PCB and switch power ON. The menu is displayed whenever SAM mode is entered. Enter into TUNER menu, select items IF-PLL for AFT alignment

Method Of Alignment

- Set AFW to 80 kHz
- Adjust IF-PLL until AFA & AFB just switching from "0" to "1". The correct value for IF-PLL is 61.

Enter into TUNER menu, select items AGC for RF AGC alignment.

Method Of Alignment

- Connect a multimeter (DC) at pin 1 of tuner.
- Adjust the AGC until the voltage at pin 1 of the tuner is 4Volts +/- 0.4V DC. The correct value for AGC should be 37.

The value can be increment or decrement by pressing the user remote control right or left key.

### *8.1.5 Picture demodulator adjustment*

Connect a pattern generator (e.g. PM5418) with a cross hatch. Connect an oscilloscope (1ms/div) to pin 6 of IC 7225-5A and adjust L5260 so that the overshoot response is minimum . Select a colour bar signal and verify if the picture is OK.

### *8.1.6 34.4MHz Trap Alignment*

NOTE: For Pal multi set only.

GENERAL SET-UP

Connect Frequency Synthesizer PM5193 with sine wave and signal strength of 100mv rms. (100dBuv) via a 50 ohm cable terminated with a RC network(50ohm,10nF) and connect to tuner C-CUT (C-CUT OPEN) . Output detection points at saw filter coil 5040 ,pin 3of 1050. The capacitor is in series with the signal, the resitor is vonnected to ground. Adjust L5040 for minimum amplitude.

## 8.2 VG2 and White-D settings

### *8.2.1 Vg2 cut off alignment*

Connect a pattern generator (e.g. PM5418) with a black picture , set picture controls of the TV set as following :

Brightness: 25

Colour : 30

Contrast: 50

Switch on the TV set and measure with a 100 : 1 scope probe at the cathodes of the picture tube socket pin 6,8 and 11 of CRT sockets C83/84 ; alternately pin 6 for Green, pin 8 for Red and pin 11 for Blue .

Measure the level of the pluses and adjust the level of the highest pluses by means of the Vg2 potentiometer (lower knob of LOT 5445). The DC level must be 140 Volts +/- 2V DC for 25" tubes and 160Volts +/-2V DC for 29" picture tubes.

*8.2.2 White-D adjustment (software adjustment)*

Connect a pattern generator (e.g. PM5418) and set it to white raster pattern.

Enter SAM by using the Dealer Service Tool or short-circuit service pins M28 and M29 on PCB and switch power "ON"

The menu will be displayed whenever SAM mode is entered. Enter into WHITE TONE menu and select item NORMAL, DELTAWARM, or DELTACOOL; only one of the three items (R, G or B) will be displayed on the screen. The initial default value setting for NORMAL is 37.The factory settings of the colour temperatures are:

| | | | | |
|---|---|---|---|---|
| NORMAL | 10500K | R = 37 | G = 37 | B = 37 |
| DELTA COOL | 14000K | R = 0 | G = 254 | B = 249 |
| DELTA WARM | 8200K | R = 0 | G = 1 | B = 3 |

## 8.3 Audio adjustments

*8.3.1 BTSC Sound adjustment (software adjustment)*

Set generator (e.g. PM5418) BLACK(without video) pattern, set audio to stereo mode, carrier "ON" and test data to 1, RF frequency NTSC 187.25MHz with signal amplitude of 1mv and connect this signal to the aerial input.

Enter SAM mode by Dealer Service Tool or short-circuit service pins M28 and M29 on PCB and switch power "ON"

The menu is present whenever SAM mode is entered. Enter into the AUDIO menu and select item according to factory setting. Check the sound quality by the generator setting listed below.

The factory settings for BTSC are :

| AUDIO | |
|---|---|
| AUTO | > |
| ST-NT | 7 |
| SAP-NT | 7 |
| LA | 7 |
| WIDEB | 19 |
| SPECT | 19 |

Abbriviations:

ST-NT -> Stereo Nicam adjustment

SAP-NT -> Second audio program adjustment

LA -> L L' adjustment

WIDEB -> Wideband adjustment

SPECT -> Spectral adjustment

NOTE: ALL VALUES ARE RECOMMENDED NOMINAL VALUES.

*8.3.2 2CS/NICAM Sound adjustment (software adjustment)*

Set generator (e.g. PM5418) BLACK(without video) pattern, set audio to stereo mode, carrier "ON" , set RF frequency PAL 189.25MHz, NTSC 55.25MHz with signal amplitude - 1mv and connect to aerial input. Enter the SAM mode by using the Dealer Service Tool or short-circuit service pins M28 and M29 on PCB and switch power "ON". The menu is displayed whenever SAM mode is entered.

Enter into AUDIO menu and select item according to factory setting. Check the sound quality by the above generator setting. The factory settings for 2CS/NICAM are :

| AUDIO | |
|---|---|
| A-FM | 80 |
| AT | 8 |
| STEREO | 143 |
| DUAL | 113 |

NOTE: ALL VALUES ARE RECOMMENDED NOMINAL VALUES.

# 9 Circuit description new circuits

Power supply (diagram A1)

## 9.1 Introduction

### *9.1.1 General*

The switched mode power supply (SMPS) is mains isolated. The control IC7520 (MC44603AP) gives pulses for driving FET 7518 with duty cycle control at fixed frequency of nominal 40 kHz in normal operation. In stand-by, slow-start and overload situation the SMPS runs at other frequencies than these 40 kHz.

Basic characteristics of SMPS :

- Mains Isolated flyback Converter type
- Input range : 90 - 276 Volts AC ( multi voltage ) or 150 - 276 Volts AC ( single voltage ).
- Secondary Sensing by Opto Coupler
- IC7520 is Featured with a Slow-Start circuitry
- Over-and undervoltage Protection Circuit of the secondary supply voltages. In case the load decreases under a certain threshold level the SMPS will switch into stand-by-mode (in stand-by SMPS is in the so called "reduced frequency mode"; this is nominal about 20 kHz).

The (VBATT (+140 Volts for A/P and +130 Volts for LATAM output gives a stabilized (VBATT for 25" and 29" tubes in normal operation and approx. 140 Volts DC for A/P and 130 Volts for LATAM in stand-by mode. IC7541 (=TDA8139) having a stable regulator for +5 Volts and +8 Volts supply and also a built-in protection circuit for +5 Volts and +8 Volts supply is present. If pin 4 is low in the standby mode, the IC disables the supply output voltage of (8Volts, so IC7225 (TDA8374C) line output stage will be shut "down". If no 8 Volts supply is present transistor 7542 will switch on, this will cut off the +VBATT; it also performs a fast CRT discharge. If the power is switched off, pin 6 of IC7541 will be low and the protection circuit starts to shut down the +5 Volts and +8 Volts.

### *9.1.2 Output voltages*

Power output secondary output voltages:

- 14 Volts for the audio amplifier
- 13 Volts for the audio processing
- 5 Volts for the control part (is also available in standby/ reset)
- 8 Volts for the video processing and Nicam
- 140 Volts for A/P and (130 Volts for LATAM for the line output stage and the tuning system

### *9.1.3 The switching periods of TS7518*

The duty cycle of the power supply depends on T-on of FET TS7518 and this is controlled by pin 3 of IC7520. This IC detects the variations of the (VBATT via sensing-winding 8-9 at the primary side of T5545. The switching period of TS7518 can be divided into three main phases: Duty cycle T-on, T-off and T-dead

- During T-on, FET 7518 will switch on and conducts, so the energy that is extracted from the mains is stored into the primary winding 2-5 of transformer T5545 with a linear increasing primary current. The slope depends on the voltage across C2508. Via T-on regulation by pin 3 of IC7520 the duty cycle of the SMPS and so the (VBATT is controlled.
- During T-on FET 7518 will switch off and does not conduct, so all energy "inside" the transformer is supplied to the load via secondary windings of T5545 and the secondary diodes (D6550, D6560 and D6570,D6590). The current through the secondary side of the transformer decreases with a linear slope of T5545.
- During T-dead FET 7518 does not conduct and no energy is extracted from the mains of supplied side, this gives space for T-on and T-off regulation.

## 9.2 Primary side

### *9.2.1 Mains input and degaussing*

- Mains voltage: this voltage is filtered by L5500 and 5502, rectified by a diode bridge rectifier 6505 and smoothed by C2508 to the DC input voltage for the SMPS at pin 5 of T5545 (e.g. 300V DC for 220V AC mains).
- Multi voltage: Only small adaptations of some component values are needed to achieve this.
- Degaussing : R3504 is a dual PTC (2PTC's in one housing). When switching "on" the set, the PTC is cold and low-ohmic. This would give very high degaussing current. After degaussing the PTC will be heated up and become high-ohmic; during normal operation the degaussing current is very low.

### *9.2.2 Start up and take over*

- Start-up : Via the start-up circuitry 3510, 3530 and 3529 the voltage coming from 220V AC mains is used to start-up IC7520 via the supply pin 1. As long as pin 1 has not reached 14.5 Volts, IC7520 does not start up and only sinks 0.3mA. If Vpin 1 reaches the 14.5 Volts, IC7520 will start (FET 7518 will conduct) and pin 1 sinks a typical supply current of about 17 mA. This supply current cannot be delivered by the start-up circuitry, so a take-over circuit must be present. If no take-over will take place the voltage on pin 1 will decrease and IC7520 will switch off; in that case the restart procedure will start again.
- Take over of IC7520: During start-up a voltage across winding 8 - 9 is built up. At the moment the voltage across winding 8 - 9 reaches approx. (14.5 Volts, D6540 start conducting and takes over the supply voltage Vpin 1 of IC7520 (take over current is approx. 17mA).

Note: This power supply is a SMPS (= Switched Mode Power Supply) and not a SOPS (= Self Oscillating Power Supply).

## 9.3 Control circuitry; see page 37 for blockdiagram.

### *9.3.1 IC7520 control mechanisms*

IC7520 controls the T-on time of FET 7518 in all three operation modes:

- "Secondary-output-sensing" controls the secondary output voltages via the feedback voltage pin 14.
- "1-prim current sensing" controls both the secondary output voltages and the maximum 1-prim via the current sense voltage pin 7.
- "Demagnetization control" prevents the transformer T5545 from going into saturation via the so called "DEMAG" function at pin 8; this will cause slow-start operation.

### *9.3.2 Secondary output voltage's feedback (pin 14 of IC7520)*

Voltage feedback for T-ON control : Regulation of the SMPS is via pin 14. Winding 2 -5 has the same polarity as winding 16 - 18, so variations of the +VBATT can be sensed and feed-back to pin 14. The control voltage of winding 2 -5 during off period of TS7518 the Opto-coupler 7581 conducted rectified by D6540, smoothed by 2540 and coupled via 7581 and adjustable by 3572. For the information at pin 14 of IC7520 controls each portion of energy transferred to the secondary side such that the output voltages remain nearly independent of load variations.

### 9.3.3 *I-prim sensing (pin 7 of IC7520)*

The current sense voltage at pin 7 is a measure for the I-prim through FET7518. The I-prim is converted into a voltage by R3518. The current sense voltage at pin 7 is used to control both the secondary output voltages and the maximum Iprim (see peak current limiting).

### 9.3.4 *Demagnetization control (via pin 8 0f IC7520)*

Winding 8 - 9 has the same polarity as the secondary windings that are supplying the load. As a result the voltage across this winding is negative during T-on, positive during T-off and oscillating during T-dead. The so called demagnetization (block " DEMAG " in IC7520) function at pin 8 of IC7520 is used for blocking the output pin 3 during the time that there is still energy in the transformer (1sec not zero). This is realized by delaying the T-on until the demagnetization is completely finished. In this way the currents and voltages at the moment of switching "on" the FET are controlled.

### 9.3.5 *IC7520 control*

The error amplifier (block A ) compares the feedback voltage at pin 14 with an internal reference voltage of 2V5. The output voltage V error-out of this error amplifier is fed to another comparator (block B). This comparator also compares the V error-out and the current sense voltage at pin 7. When the current sense voltage at pin 7 becomes higher than the output-voltage of the error amplifier V error-out, the comparator B gives a spike (the output of comparator B is the so called current sensing output-voltage Vcs out).

### 9.3.6 *Flip flop*

Flip flop (in block C) drives the output pin 3 via a buffer amplifier (block D). The flip flop is set by the positive edge of the output of the oscillator, V osc and reset by the spike V cs out. As a result the pulse at pin 3 becomes "high" --> T-on starts and by the positive edge of Vosc from the internal oscillator and "low" --> T-on stops by the spike of Vcs out . The T-on start will be delayed in case the transformer is not yet demagnetized; see the slow-start procedures.

### 9.3.7 *Stable load and increasing / decreasing load*

In case of a stable load, the feedback voltage at pin 14 and so also the maximum current sense voltage at pin 7 remains the same; as a result the T-on and the duty cycle will remain the same. In case of an increasing load, the secondary output voltage will decrease. The voltage on pin 14 would also like to decrease which causes a V error -out to increase. As a result comparator B will give the pulse later; pin 3 will be "high" for a longer period (longer T-on so the duty cycle increase) and so the secondary output voltages will be increased (corrected). This will give a new balance of feedback voltage at pin 14 and the internal 2V5 reference voltage, at a new and larger duty cycle. As a result of the longer T-on, the maximum I-prim increases, so more energy will be stored in the transformer. In this way more energy will be supplied to the load. In case of a decreasing load, the secondary output voltage increases. The voltage on pin 14 would like to increase which causes V error-out to decrease. As a result comparator B will give the pulse earlier, Vpin 3 will be "high" for a shorter period (shorter T-on so the duty cycle decrease) and so the secondary output voltages will be decreased (corrected). This will give a new balance off feedback voltage Vpin 14 and the internal 2V5 reference voltage, at a new smaller duty cycle. As a result of the shorter T-on, the maximum I-prim decreases, so less energy can be stored in the transformer. In this way less energy will be supplied to the load. In case the demagnetization of the transformer is not yet finished, the positive edge from the oscillator, which will start a new cycle, will be overruled via buffer block D as being the starting point of T-on will be delayed and frequency of the SMPS will go down. This procedure is used during start-up.

### 9.3.8 *Peak current limiting*

Peak current limiting is realized by an internal clamp at pin 7. This can never exeeds 1V DC and so the maximum value of I-prim, maximum current through FET 7518, is determined. In case load needs more than the maximum power, by then the I-prim is already at his maximum level so the SMPS will go in overload protection (see also foldback principle explained at overload protection).

### 9.3.9 *Cycle-by-cycle control*

The T-on control is regulated on a cycle-by-cycle basis see block C in IC7520. This means that in every cycle the T-on is determined again. By doing so the secondary voltages control, peak current limitation and all protections is very accurate and fast.

### 9.3.10 *Slow-start*

As soon as Vpin 1 > 14.5 Volts DC the SMPS will start-up. This will be done by a slow-start procedure where both the frequency and the duty cycle will be built up. The following three phenomena's will take place during start-up:

- The frequency will slowly increase to the nominal frequency of 40 kHz for normal operation and 20 kHz for standby). This is realized via the demagnetization function at pin 8; via this "DEMAG" function, FET 7518 will only conduct and T-on will become "high", when T5545 is totally demagnetized.
- The voltage at pin 5 determines the foldback point. As during start-up this pin 5 is gradually built-up, the foldback point will also gradually increase, see foldback principle explained at overload protection.
- The duty cycle will slowly increase beginning with the absolute lowest possible duty cycle. The maximum duty cycle is determined by C2530 at pin 11 of IC7520, as C2530 is unchanged at start-up.

### 9.3.11 *Standby mode*

In standby mode the load will get under a certain threshold level, decrease; see description of standby on the secondary side. The SMPS will determine this threshold level and switch to the so called "reduced frequency mode" at about 20 kHz; this minimal load threshold level is determined by R3532 at pin 12. In the L7.3 chassis the SMPS does not have a burst mode in standby but only a reduced frequency mode of about 20 kHz. In normal operation mode the internal oscillator is about 40 kHz. This frequency is controlled by C2531 at pin 10 of IC7520 and by R3537 at pin 16 of IC7520. In standby mode the internal oscillator is about 20 kHz.; this frequency is controlled by R3536 at pin 15 of IC7520.

### 9.3.12 *FET 7518 gate regulation*

D6514 prevents pin 3 of IC7520 of becoming negative because this will destroy the IC due to stray inductance in the gate part.

The safety resistor R3525 limits the drive current to the gate of FET 7518. In a stable situation Vpin 14 is typical 2V4.

*9.3.13 Typical values for the L7.3 chassis*

| Mains Voltage: | |
|---|---|
| 90 - 276V multi voltage | 150 - 276V single voltage |

| Mains frequency: 50 Hz , 60 Hz |
|---|

| Power consumption | in normal mode: |
|---|---|
| 25" | 75W + /- 10% |
| 29" | 90W +/- 10% |

| Power Consumption in stand-by mode: 11W |
|---|

## 9.4 Protections

*9.4.1 Over voltage protection of the secondary voltages*

After start-up the supply voltage pin 1 will be take over by positive winding 8 - 9 and after start up pin 1 is the measuring point for the secondary output voltage. After start-up via an internal switch pin 1 is internally tapped (voltage divider) to a voltage which can be measured at pin 6; pin 6 is also a measuring point for the secondary output voltages. If the voltage at pin 6 > 2.5 Volts, the logic in IC 7520 will shut down the output pin 3. This 2.5 Volts threshold at pin 6 is equivalent to 16 Volts DC which is equivalent to a voltage at the supply voltage (V BATT of approx. 108 Volts DC in normal operation and 130 Volts DC in standby. After switching "off", the IC starts up again because of over voltage protection; see slow-start.

REMARK: In case an overvoltage situation is sensed at the secondary output voltages, the SMPS will go in protection; in case the overvoltage situation remains present the SMPS will start slow, etc.; this is a very good audible hick-up mode.

*9.4.2 Under voltage protection of the secondary voltages*

If the supply voltage at pin 1 < 9 Volts DC the output pulse at pin 3 will be shut down.

Note: The DC voltage at pin 1 is equivalent to a voltage at V BATT of approx. 70V DC in normal operation and the voltage at pin 1 of 7.5 Volts is equivalent to a voltage at (V BATT of approx. 55V DC in normal operation and 65V DC in standby. In case an over voltage situation is sensed at the secondary output voltages, the SMPS will first switch "off" the pulses and later the complete IC 7520 will be switched "off". In case the IC 7520 is switched "off" also the SMPS will switch "off". In case the under voltage situation remains present, the SMPS will give under voltage protection like slow-start, etc; this is a very good audible hick-up mode.

*9.4.3 Unload protection*

In case the load goes down e.g. the line goes down because of stand-by mode or some failure in the line circuitry this will be detected by IC7520 via I-prim and secondary output voltages sensing. In case the load decreases below a certain threshold the SMPS will switch in "reduced frequency mode" of about 20 kHz ; this threshold is determined by the voltage level at pin 12 of IC 7520.

REMARK: In case of an unload situation the set will switch to "low frequency mode" or standby mode. Whether this unload situation of the SMPS is caused by the standby command or by a failure e.g. in the line circuitry this can be determined by switching on the set again which the remote control. In case of standby mode the TV will switch "on" again; in case of unload situation the set will NOT switch "on".

*9.4.4 Overload (short-circuit) protection*

If the secondary load becomes too high, I-prim also becomes too high; this is sensed by the current sense voltage at pin 7. This voltage at pin 7 is not allowed to exceed 1 Volts DC and it has current limiting. As the I-prim is limited, the secondary output voltages will drop and supply voltage at pin 1 will also drop. As soon as pin 1 < 9Volts DC the driving pulses at pin 3 will stop. As a result of these two mechanisms in case of an overload the secondary voltages will drop very fast, this is called the foldback mechanism. The foldback point can be adjusted by pin 5 of IC7520 and this point is adjusted to a maximum tolerable output power of 85W at 90 Volts AC and 165W at 276Volts AC. After this foldback the IC starts up again (see slow-start); in case the overload situation remains present, the SMPS will give foldback again, slow-start, etc.: as a result in case of short-circuit or overload the TV will be in a good audible hick-up mode.

## 9.5 Secondary side

*9.5.1 Output voltages*

See 9.1.2 for output voltages.

*9.5.2 Regulator IC TDA 8319 (7541)*

This is a low-dropout regulator. This IC has an output voltage of +5 Volts , +8 Volts and RESET signal; the input is 11 Volts.

The Pin configuration of this IC is listed below:

- Pin 1 of the IC is input 1 and the output 1 pin 9 that is +5 Volts DC.
- Pin 2 of the IC is input 2 and the output 1 pin 8 that is +8 Volts DC.
- Pin 3 of the IC is a timing capacitor input and controls the turn-on delay of the reset signal.
- Pin 4 of the IC is a disable pin connected to standby pin of the microcontroller, if the voltage below 0.5 Volts the +8 Volts output will be disabled.
- Pin 5 of the IC is a common ground .
- Pin 6 of the IC is a reset voltage output connected to the microcontroller. This reset output is developed with respect +5 Volts output level of 4.95 Volts.
- Pin 7 of the IC is a program pin for output 2, in this circuit this output pin 8 is programmed to +8.2 Volts by resistors 3552, 3553 and 3554.

Other features of this IC:

- Built-in thermal protection.
- Built-in over current and short circuit protection for +5 Volts and +8Volts.
- Low dropout voltage

## 9.6 SINGLE CHIP PROCESSOR IC7225 (=TDA8374)

Introduction :

In this chip most of the video, audio and sync circuits are integrated and in the diagrams the IC is split up into 5 parts: 5A,5B,5C,5D and 5E.

- IC7225-5A, video detector ,see diagram A4.
- IC7225-5B, source select en PAL demodulator ,see diagram A6.
- IC7225-5C, video control, see diagram A4.
- IC7225-5D, horizontal and vertical sync, see diagram A3.
- IC7225-5E, mono sound demodulator, see diagram A4.

### *9.6.1 IC7225-5A, IF video detector, see diagram A4*

Tuning system

For the tuner 1000 there are two possibilities: VST type or PLL type and in both cases the tuner is controlled by the uC. The VST tuner is controlled via V_TUNE, AFC and the BS1, BS2 band switching signals; the PLL tuner is fully I2C controlled. IC 7225-5A contains the IF amplifier and the IF detector, the IF signal is present at the output pin 11 of the tuner. BS1 and BS2 (pin 17-18) switching signals used for band switching of a VST tuner.

| | BS1 | BS2 |
|---|---|---|
| VHF1 | 0 | 1 |
| VHF2 | 1 | 0 |
| UHF | 1 | 1 |

IF bands pass filter , the IF bands pass characteristic is determined by the band-pass of the SAW filter 1015, listed below you will find the possibilities :

- For PAL BG sets a SAW filter with 5.5 MHz bandwidth is used (33.4 to 38.9 MHz).
- For PAL 1 sets a SAW filter with a bandwidth of 6.0 MHz is used (32.9 to 38.9 MHz).
- For PAL BG/SECAM BG/LL' sets a SAW filter with 6.5 MHz band switch is used to enable BG/I/LL' reception (33.9 to 40.4 MHz).
- For PAL BG/SECAM BG/DK sets a SAW filter with a bandwidth of 6.5 MHz is used (32.4 to 38.9 MHz).

IF-demodulator

IF-demodulation is done with reference circuit L5260 at pin 3 and 4 of IC7225-5A; AGC control of tuner via pin 54 IC7225-5A. Top sync level is used for AGC inside IC7225-5A. AGC adjustment is done by 1(C control via entry into the SAM service menu. C2202 at pin 53 determines time constant of the AGC. Base band CVBS signal at pin 6 of IC7225-5A (normal - 3V2) is fed to the sound trap filters (1206, 1207, 1208, 1209 and 5206) and returns to pin 13 of IC7225-5B for source selection and video processing (diagram A6). The NTSC_ SW signal from the control microprocessor switches on transistors 7216 and 7217 to activate filter 1209 when an NTSC signal is received. Demodulation for sound IF takes place for the various signals as follows: For single mono signal, the CVBS_Sound signal goes to filter 1104 for 4.5 MHz and filter 1102 for 5.5MHz. The sound _IF is connected to pin 1 of IC7225-5E for demodulation.

### *9.6.2 PAL/NTSC Processing (IC7225-5B, see diagram A6)*

IC7225-5B contains : source selector and PAL/NTSC colour decoder.

The main functions are :

- Source Selection
  The input selector has CVBS_INT< CVBS_EXT1,Y_CVBSEXT2, C_EXT2 as inputs which can be selected via the 12C bus.
- Colour Decoder; the main functions are :
  - PLL/VCO
    The PLL operates during the burst key period. It synchronizes the VCXO oscillator with the frequency and phase of the incoming chroma burst. For alternating burst (PAL standards), a loop filter enables the PLL to synchronize with the average burst (180 degrees phase).

- PAL/NTSC Identification
- Secam Interface
  The 0 and 90 degrees reference signals from the VCO oscillator are supplied via the HUE phase circuit to the (B-Y) and (R-Y) burst demodulators respectively. The demodulated burst from the (B-Y) burst demodulator is supplied both to ACC detector and NTSC indent circuit; the NSTC indent circuit is an integrator. Once the integrator output exceeds the NTSC killer level, an NTSC burst has been identified (IDN=1). Therefore the IDN information provided the ASM (Automatic System Manager) with NTSC colour indent information. The demodulated burst from the burst from the (R-Y) burst demodulator is supplied to the PAL identcircuit via a AL switch; the PAL ident circuit is also an integrator. Once the integrator output exceed the PAL killer level, a PAL burst has been identified (IDP=1). The IDP information provides the ASM with PAL-colour ident information.
  The SECAM interface allows bi-directional communication between IC7241 (TDA8395) and the ASM for SECAM identification. If the VCO oscillator is oscillating at 4.43 MHz, the reference frequency of 4.43mhz is superimposed on a DC level and is supplied from pin 33 of IC7225 to pin 1 of IC7241. If PAL/NTSC signals are identified, the reference frequency is continuously available at pin 33 and superimposed on a 1.5V DC level. When SECAM is identified by IC7241, the reference signals which is generated in packets form and superimposed on a 5V DC level is supplied to pin 33 of IC7225.The ident signal (IDSM=1) is supplied to the ASM.
- ASM (Automatic System Manager)
- (R-Y)/(B-Y) demodulation
  The ASM is able to decode PAL/NTSC colour standards and in combination with IC7241(TDA8395), multi standard applications can be realized. The different possibilities are controlled by the 12C bus input commands which are communicated to the ASM via the 12C bus. The 12C bus input commands also indicates which crystals must be connected to pins 34 and 35. This is essential for correct calibration of the horizontal oscillator.
  For PAL/NTSC standards, the (B-Y)/(R-Y) baseband signals are extracted from the chroma signal by the (B-Y)/(R-Y) demodulators, filtered and supplied via the output switch to pins 29 and 30. If SECAM is identified by the SECAM decoder IC7241 and no PAL/NTSC is identified by the ASM, then the ASM will open the switch (B-Y)/(R-Y). This implies (B-Y)/(R-Y) signals from the SECAM decoder will be directly connected to pin 29 and 30 without extra loading.

*9.6.3 Video controller (IC7225-5C, see diagram A4)*

The main functions are :

- Y/(B-Y)/(R-Y) signal processing/matrix
- RGB signal selection/processing/output stages
- Black stretcher
- Beam current limiter (BCL,PWL)
- Automatic black current stabilization (ABS) .

Y/(B-Y)/(R-Y) signal processing/matrix

The luminance at pin 27 is internally AC coupled to the luminance clamp, which is operational during burst key period. The luminance signal is supplied to the RGB matrix circuit via the black stretcher. The (B-Y)/(R-Y) signals supplied to pins 31 and 32 are clamped during the burst key period. The signals are then supplied to the colour difference matrix to select the desired matrix formv either PAL, NTSC or Japanese NTSC matrix. The selected matrix is controlled via the 12C bus. For RGB matrix the signal outputs from the colour difference matrix are added with the luminance signal in colour to generate the internal RGB signals.

RGB signal selection/processing/output stages

Within the RGB signal selection there are three modes:

- RGB (internal)
- Fast RGB insertion (R_TXT G_TXT B_TXT on pins 23, 24 and 25)
- OSD-mode

Teletext

Two different types of microprocessors IC7600/7601 are used: one with teletext(TXT) and one without teletext.

The micro-controllers are:

| | | | |
|---|---|---|---|
| P83Cx66 | 42 pins | Normal | ROM size varies |
| SAA529x | 52 pins | Control withTeletext | ROM size varies |
| P83CX69 | 52 pins | Control with Close caption | ROM size varies |

| Type of micro-controller | Type of tuning | System | Countries |
|---|---|---|---|
| P83Cx66 | VST | PAL/SECAM | AP |
| | PLL | NTSC | Latam |
| SAA529x | VST | PAL/SECAM | AP |
| P83Cx169 | PLL | BiNorma/ TriNorma | Latam |

The oscillator to be used is 12MHz; a crystal oscillator will be used for all the micro-controllers.

- In case of TXT this function is integrated together with the control part in one and the same uC. This uC is indicated in the diagrams with the outer pin numbering.
- In case of no TXT another (C is used with less pins. This uC is indicated in the diagrams with the internal pin numbering.

In the description below, the pin numbers are the numbers mentioned outside the housing of IC 7600 (IC7600 with TXT and IC7601 without TXT). In case of the (C with integrated teletext function the CVBS-TXT signal is fed to pin 23, the TXT and OSD- information are combined at pins 32,33 and 34.

Before the RGB signal selection the RGB signals are clamped to similar DC level during burst key period. The selection is controlled by the RGB insertion input voltage at pin 26.

| Voltage at pin 26 | selected RGB signals |
|---|---|
| < 0.3V | RGB(internal) |
| 0.9V < V < 3V | (R_TXT G_TXT B_TXT (fast insertion at pins 23, 24 and 25) |
| > 4V | OSD can be inserted at the RGB-out pins |

The contrast, brightness and white-point RGB adjustment on the selected RGB signals are controlled by 12C commands. After the adjustment, three RGB black levels are added to the RGB signals. These three signals are blanked when the RGB blank signal is active. The RGB output stages supply the buffered RGB signals pins 21, 20 and 19.

Black Stretcher

The black stretcher circuit, which is only operational during line scan, extends the gray signal level towards the actual black level (= actual black level measured during burstkey). The amount of extension is dependent on the difference between actual black level and the darkest part of the incoming video signal. The darkest part of the videosignal is registered in the capacitor at pin 39 by means of an internal discharge current of approximately 130uA. The black stretcher is made inactive if the voltage at pin 39 is set to ground. This is done by turning on transistor 7220, the command blackstraw coming from the microprocessor (if power button on the remote control unit is activated).

Beam Current Limiter

The beam current limiter circuit functions as an average white limiter as well as peak white limiter. The average white limiter needs external circuitry comprising of 7265, and associated components to function; the peak white limiter is an internal detection circuit. The function of the beam current limiter (average white / peak white limiter) reduces the contrast and brightness of RGB signals. For beam current limiting, the difference in beam current (1BCL) and an internal charge current (1CHARGE) is stored in capacitor 2460 on pin 22. If 1BCL > 1CHARGE voltage (VBCL) at pin 22 will decrease. For beam current limiter contrast reduction begins if VBCL < 3.5V and brightness reduction begins if VBCL < 2.5V. VBCL is normally about 4V if the beam current limiter is not active .

The contrast and/or brightness reduction of the RGBout is proportional to the voltage decrease at pin 22.

*9.6.4 Horizontal synchronization IC 7225-5D and the line output stage (see diagram A3)*

Protections:

The line deflection incorporates protections like:

- X-ray protection. If the EHT will become too high, the tube will radiate too much X-ray, this is detected by monitoring the flyback pulses at pin 11 of the LOT.
- Beam current protection. If the beamcurrent becomes too high the Bimos is able to reduces this by making the EHT_info line low. The circuitry around transistor 7481 in circuit diagram A2, will detect this and create a PROT signal.
- The E/W amplifier has two protections. One protection for overcurrent, for exampleshort circuit of E/W FET and one protection for overvoltage; like interrupted capacitor in lower half of the diode modulator.

Start-up of the horizontal oscillator via the (8V gives a start-up current to pin 37; if the voltage on pin 37 exceeds 5V6 the horizontal oscillator starts to oscillates at approx. 25kHz. Only if the supply pin of IC 7225 (= pin 12 at IC 7225-5A in diagram A4) becomes 8V the line frequency will change to 15625 Hz. The horizontal synchronization separator separates horizontal pulses out of CVBS signals and synchronizes the free-running horizontal sawtooth generator. The horizontal oscillator sawtooth is converted into a square wave voltage with variable duty cycle. This square wave at pin 40 is fed to the line output stage. The time constant of the synchronization circuit is automatically internally determined by IC 7225-5D. Pin 41 is SANDCASTLE output and also HORIZONTAL FLYBACK input.

- The SANDCASTLE has an output current a some mA, the amplitudes of sandcastle pulse is : burst 5V3, line blanking 3V and during frame blanking 2V.
- If the input acts as a HORIZONTAL FLYBACK pulse, the input has a current of 100-300 mA. This horizontal flyback pulse compares the phase of flyback pulse with phase of the horizontal oscillator; if the phase is not correct the duty cycle of horizontal oscillator will be adjusted.
- Flash protection: The BCI info is applied to pin 42 of IC7225-5D. If due to a flash in the picture tube the voltage at pin 42 is > 6V, the horizontal drive will be switched off immediately. If the voltage is again < 6V the horizontal drive will be switched on again via the slow start procedure.
- EHT over voltage protection. The BCI info is also applied to pin 50 of IC7225-5D. First the BCI will compensate vertical picture amplitude variations due to beam current variations. The control range is between 1.2V and 2.8V. However if the voltage at pin 50 exceeds 3.9V the EHT overvoltage protection will be activated and the horizontal drive is switched off.

**The line output circuitry**
In principle the line output stage pin 40 of IC 7225-5D drives the line output stage consisting of TS 7445 and transformer 5445 via drivers TS 7440-7441. The line output stage supplies the deflection current and the following supply voltages (see also the power supply block diagram ) :

Output voltage (See diagram A2) LOT (5445 Line output transformer) output voltage

- EHT, + 200V, Vg2, focus and ff for the picture tube.
- 200V for the CRT drive
- + 5V for the control and tuner supply
- + 9V for the tuner supply
- + 11V for the control and vertical drive output
- - 11V for the vertical drive output

**Vertical synchronization IC 7225-5D and the frame amplifier IC 7401**
The vertical oscillator (= 50Hz) is controlled by the incoming video signal. The vertical output is driven in anti-phase via the pins 46 and 47. At pin 41 the so called "Sandcastle " pulse is present; the sandcastle pulse is applied to several parts of the circuits for timing purposes.

**Frame amplifier**
In principal the frame output stage IC 7401 (TDA9302H) is used for the vertical deflection. This IC is controlled at pins 1 and 3 by the vertical control signal of IC 7225-5D and a deflection current is generated at pin 5. The vertical flyback signal is generated at pin 3 of this IC.

Protection of IC 7401; depending on +11V and -11V supply to drive the vertical deflection CRT. In case of supply voltage +11V or -11V needs a too high current, the VFL pin 3 of IC 7401 voltage will drop < 6.5V. As a result the VFL will feedback this to pin 37 of 7600 micro processor and this will switch the supply to stand-by mode.

### *9.6.5 Sound detector (IC7225-5E, diagram A4)*

Single FM-mono sound for demodulation will take place in IC7225-5E. No adjustment are required because of automatic PLL tuning from 4.2 to 6.8 MHz .

## 9.7 Information of NVRam, tuners, video and audio I.C.'s.

The following components are also applied in this chassis:

- IC7620 in circuit diagram A5: NVRAM : ST24W04B1 (Non-Volatile Memory). The ST24W04B1 is a 4k bit EEPROM device. The enable pins E1 and E2 selects between maximal four different ST24W04B ICs. Last status of a set is stored in the EEPROM and can be retrieved whenever there is a power interruption
- Tuner 1000 in circuit diagram A4: UV1355 or UV1336 is applied :
  The list of tuners is as follows:
  For 25” and 29” AP, tuner type UV1335 is used; Type of tuning is VST.
  For 25” and 29” Latam, tuner type UV1336 is used; Type of tuning is PLL.
- Audio IC's:
  - IC7310: TDA9860, Audio processor IC
  - IC7315: TDA9850, BTSC DBX decoder with SAP
  - IC7312: AN 7312, AVC= automatic Volume Correction
  - IC7202: MSP3410D, Nicam stereo decoder
  - IC7202: MSP3400C, 2CS Korea and 2CS German decoder
  - IC7313: HEF4052, switch function IC
  - IC7311: TDA7057A , 2X3W stereo sound amplifier

For European and A/P sets we can have 2CS, mono/stereo/ dual sound: this is decoded by IC7202(=MSP3400/MSP3410) on Nicam sound panel "C". Also Nicam mono/stereo/dual sound is decoded by IC7202.

For A/P, Latam and USA we use the BTSC decoding ; see IC7315 in circuit diagram A8.

NTSC/SECAM sound system IC (BTSC decoding IC)

General description of BTSC specifications

The BTSC sound system is based on the AM-FM method and is capable of broadcasting:

- MONO information {only MONO Carrier modulated}
- STEREO information {MONO C -> 1/2(L+R) and STEREO SC -> 1/2(L-R)}
- DUAL information {MONO C -> language A and SAP SC -> language B}

- STEREO & SAP information
- STEREO: {MONO C -> 1/2(L+R) and STEREO SC-> 1/2(L-R)} and SAP:{second audio channel}

The sinlge FM-mono sound decoding will take place in IC7225-E; see circuit diagram A4.

IC7312 (= AN7318S) in diagram A7 is an Automatic Volume Correction (AVC) present. Automatic volume correction (AVC) function provides a constant output level of -18dBFS for input levels between 0dBFS and -24dBFS. In this way it is possible to adjust different sound sources (eg Terrestric/SAT channels, SCART) to equal volume level. The increased volume of advertising is compensated as well. The volume correction step width is quasi continuosly. The filter maximum is performed with an attack time of 16ms and a programmable decay time i.e 8,4,2 sec and 20ms

IC7311: TDA7057AQ in circuit diagram A7 is a 2X3W stereo sound amplifier.

BLOCK DIAGRAM MC44603P

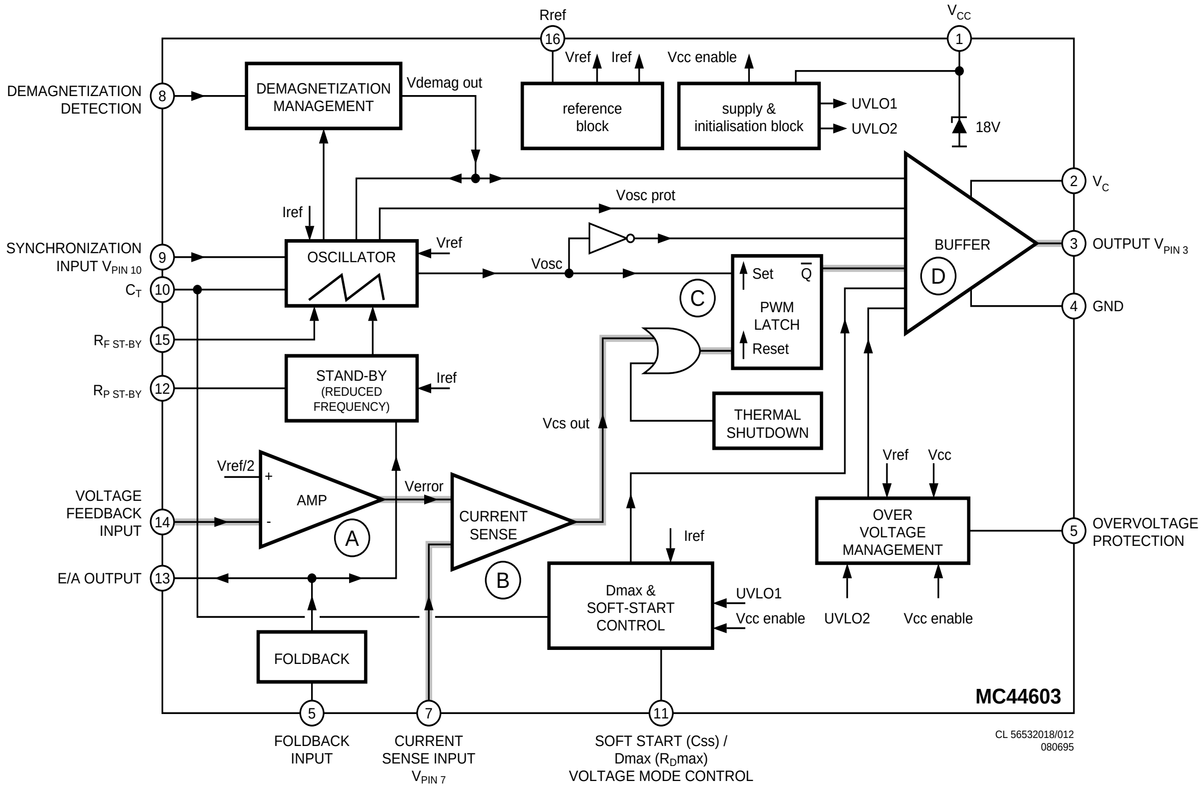
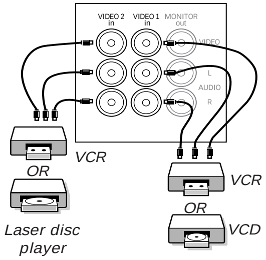

Rref
16
VCC
1
Vref
Iref
Vcc enable
DEMAGNETIZATION DETECTION
8
DEMAGNETIZATION MANAGEMENT
Vdemag out
reference block
supply & initialisation block
UVLO1
UVLO2
18V
2
VC
Vosc prot
Iref
SYNCHRONIZATION INPUT VPIN 10
9
OSCILLATOR
Vref
Vosc
BUFFER
3
OUTPUT VPIN 3
D
CT
10
Set
Q̄
PWM LATCH
Reset
C
4
GND
RF ST-BY
15
RP ST-BY
12
STAND-BY (REDUCED FREQUENCY)
Iref
THERMAL SHUTDOWN
Vcs out
Vref
Vcc
Vref/2
+
AMP
-
A
Verror
VOLTAGE FEEDBACK INPUT
14
CURRENT SENSE
B
OVER VOLTAGE MANAGEMENT
5
OVERVOLTAGE PROTECTION
Iref
E/A OUTPUT
13
Dmax & SOFT-START CONTROL
UVLO1
Vcc enable
UVLO2
Vcc enable
FOLDBACK
MC44603
5
7
11
FOLDBACK INPUT
CURRENT SENSE INPUT VPIN 7
SOFT START (Css) / Dmax (RDmax) VOLTAGE MODE CONTROL
CL 56532018/012 080695

Figure 9-1

## Connecting peripheral equipment

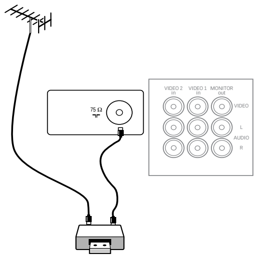
Equipment such as VCR, Laser disc player, VCD etc. could be connected to the video and audio (AV) sockets at the back of the TV. Switch off the TV and equipment before making any connection.

### Connection for playback



1. Connect to AV sockets
- connect the corresponding sockets of the equipment to that of the TV.
- to view the playback, select a channel named AV1 (if connection is made to sockets at VIDEO 1 in) or AV2 (if connection is made to sockets at VIDEO 2 in).

*Note : If you have connected a computer game set to VIDEO 1 in, select a channel named GAME1 to playback. If your connection is made to VIDEO 2 in, then select GAME2 to playback.*

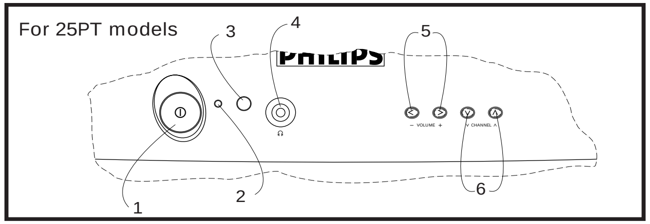


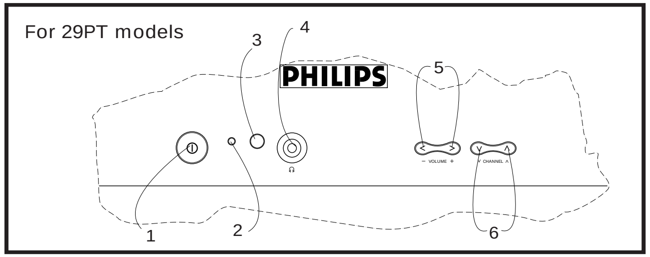
2. Connect to aerial socket
(only for VCR)

The playback on your VCR is considered a TV channel by your TV if you connect via the aerial socket. You must tune in to your VCR's test signal and assign the channel number 0 to it. Refer to your VCR's instruction manual for more details.

- connect the RF cable to the VCR's "RF in" and connect the "RF out" of the VCR to the aerial socket of the TV.
- select channel 0 and tune in to to your VCR's signal.
- to view the playback, select channel 0.

## The TV's controls

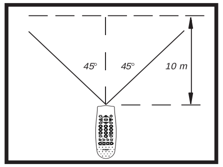

For 25PT models

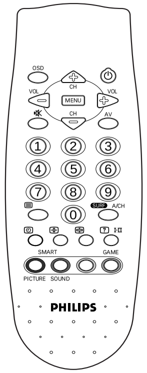

For 29PT models

| | |
|---|---|
| 1. Mains power | Switch on or off the TV. |
| 2. Red light indicator | When light is on, it indicates that the TV is on standby. Note :If no signal is detected by the TV after 10 minutes, it will switch to standby automatically. |
| 3. Remote control sensor | For the remote control to work, it must be activated within the operating range of this sensor. |
| 4. Headphone socket | For connection of headphones. |
| 5. Volume adjustment | To adjust volume level. Press these 2 keys simultaneously will call up the 1st level menu. Press these 2 keys again will exit menu. Works as cursor left (VOLUME −) or right (VOLUME +) in a menu. |
| 6. Channel selection | To select a lower or higher channel number. Works as cursor up (CHANNEL ∧) or down (CHANNEL ∨) in a menu. |

## Using the remote control

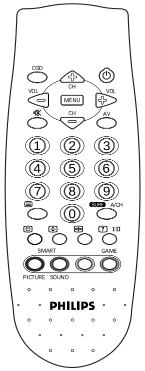
For the remote control to work effectively, it has to be operated within the recommended operating range to the remote control sensor on the TV.





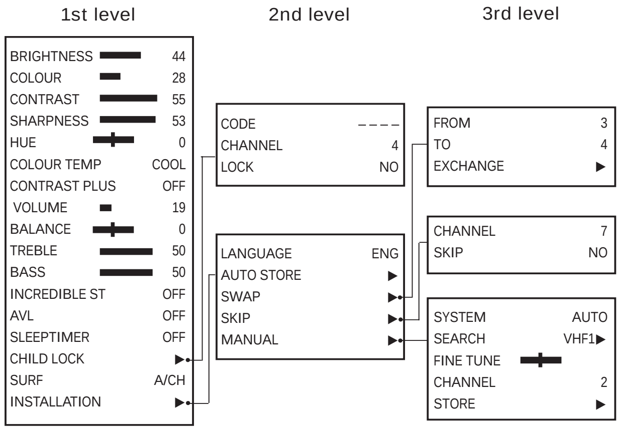
| Press : | | Result : |
|---|---|---|
| OSD | Screen information | In TV mode : Display channel number and sound mode<br>In a menu : Exit menu. |
| ⏻ | Standby | Switch off TV and a red indicator lights up. To switch on TV again, press either the ⓪ to ⑨, CH +, CH −, SURF A/CH, AV or ⏻ key. |
| AV | External source | Select the external channels AV1 or AV2. |
| 🔇 | Mute | Switch off the sound of the TV. Press again to switch on the sound. |
| MENU | Menu | Call up the main menu. If there is an existing menu, pressing this key will bring you back to the previous level menu. If you are in the 1st level menu, pressing this will exit the menu. |
| CH + CH − | Channel selection/ cursor up or down | TV mode : Select a higher or lower channel number .<br>In a menu : Scroll up or down. |

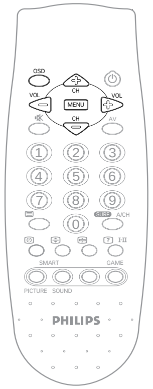
*...using the remote control*



| Press : | | Result : |
|---|---|---|
| VOL + VOL − | Volume adjustment /cursor right or left | TV mode : Adjust the volume of the TV set.<br>In a menu : Select or execute. |
| ⓪ to ⑨ | Digit | Key in numerals e.g. confidential code in child lock and in channel selection. For a 2-digit channel, the second numeral must be entered before the dash disappears. |
| SURF A/CH | Surf or alternate channel | Surf mode : Add or delete channel from the surf list. View channel in the surf list.<br>A/CH mode : Return to the previous channel. |
| Teletext function:<br>I-II<br>SMART SLEEPTIMER GAME<br>PICTURE SOUND | | Refer to the section on "Teletext". |
| ? I-II | Sound mode | Switch from stereo to mono sound (for stereo transmission) or choose between first language or second language (for bilingual transmission). |
| GAME | Game | Select preset channels for games. |
| SMART<br>PICTURE SOUND | Smart controls | Select the presets for sound and picture. |

## Menus


1st level
2nd level
3rd level
BRIGHTNESS 44
COLOUR 28
CONTRAST 55
SHARPNESS 53
HUE 0
COLOUR TEMP COOL
CONTRAST PLUS OFF
VOLUME 19
BALANCE 0
TREBLE 50
BASS 50
INCREDIBLE ST OFF
AVL OFF
SLEEPTIMER OFF
CHILD LOCK ▶
SURF A/CH
INSTALLATION ▶
CODE ----
CHANNEL 4
LOCK NO
LANGUAGE ENG
AUTO STORE ▶
SWAP ▶
SKIP ▶
MANUAL ▶
FROM 3
TO 4
EXCHANGE ▶
CHANNEL 7
SKIP NO
SYSTEM AUTO
SEARCH VHF1▶
FINE TUNE
CHANNEL 2
STORE ▶

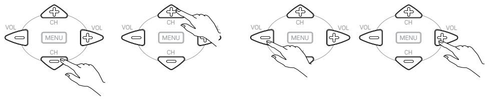

OSD
CH
VOL
MENU
AV
1
2
3
4
5
6
7
8
9
0
A/CH
SMART
GAME
PICTURE
SOUND
PHILIPS

To call up the 1st level menu :

- Press MENU key.

To use the menus:

- Press the cursor keys.



*scroll up* *scroll down* *select or execute*

To exit from a menu:

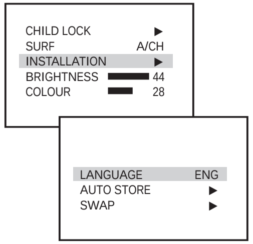
- Press MENU key to go back to the previous level.

OR

- Press OSD key to exit.

## Installing the TV

### Selecting the menu language

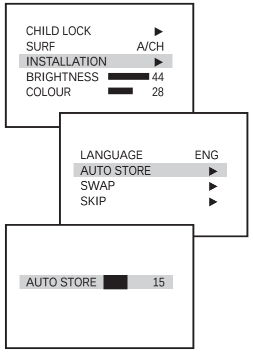

CHILD LOCK ▶
SURF A/CH
INSTALLATION ▶
BRIGHTNESS 44
COLOUR 28
LANGUAGE ENG
AUTO STORE ▶
SWAP ▶

1. Call up 1st level menu with the MENU key.
2. Scroll up with the △ key to highlight INSTALLATION.
3. Select INSTALLATION with the ◁ or ▷ key. LANGUAGE is highlighted.
4. Select the language of your choice with the ◁ or ▷ key. From now on, all menus and screen information will be in the language that you have chosen.
5. Exit with the OSD key.

### Tuning in the TV channels

There are 2 ways to tune in channels : automatically (by AUTO STORE) or manually (by MANUAL menu).

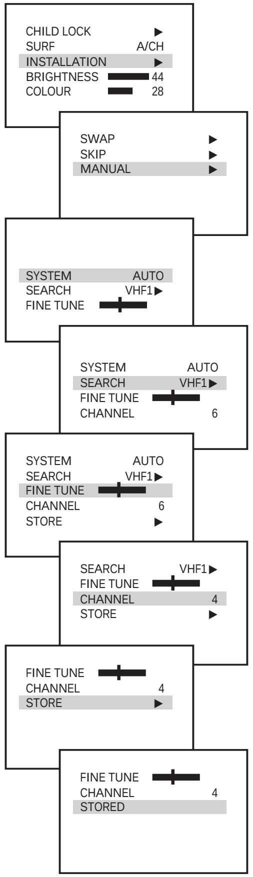
#### Auto store


CHILD LOCK ▶
SURF A/CH
INSTALLATION ▶
BRIGHTNESS 44
COLOUR 28
LANGUAGE ENG
AUTO STORE ▶
SWAP ▶
SKIP ▶
AUTO STORE 15

Use to tune in channels automatically.

1. Call up 1st level menu with the MENU key.
2. Scroll up with the △ key to highlight INSTALLATION.
3. Select INSTALLATION with the ◁ or ▷ key.
4. Scroll down with the ▽ key to highlight AUTO STORE.
5. Select AUTO STORE with the ◁ or ▷ key.

*A tuning bar appears and the TV will automatically store all available channels. Channels will be stored starting from the next channel number .*


CHILD LOCK ►
SURF A/CH
INSTALLATION ►
BRIGHTNESS 44
COLOUR 28
SWAP ►
SKIP ►
MANUAL ►
SYSTEM AUTO
SEARCH VHF1►
FINE TUNE
SYSTEM AUTO
SEARCH VHF1►
FINE TUNE
CHANNEL 6
SYSTEM AUTO
SEARCH VHF1►
FINE TUNE
CHANNEL 6
STORE ►
SEARCH VHF1►
FINE TUNE
CHANNEL 4
STORE ►
FINE TUNE
CHANNEL 4
STORE ►
FINE TUNE
CHANNEL 4
STORED

## Manual

This menu enables you to search and store every available channel manually.

1. Call up 1st level menu with the MENU key.
2. Scroll up with the ▲ key to highlight INSTALLATION.
3. Select INSTALLATION with the ◄ or ► key.
4. Scroll down with the ▼ key to highlight MANUAL .
5. Select MANUAL with the ◄ or ► key.
6. Scroll down with the ▼ key to highlight SEARCH.
7. Select the band (UHF, VHF1 or VHF3) with the ◄ key.
8. Press the ► key to start searching. Searching stops once a channel is available. If you decide to store the channel, proceed to the next step. If not, press the ► key to start searching again.
9. If you wish to fine tune the channel, scroll down to highlight FINE TUNE. Press the ◄ or ► key to fine tune.
10. Scroll down with the ▼ key to highlight CHANNEL and assign a channel number to the channel that you found.
11. Scroll down with the ▼ key to highlight STORE and press the ◄ or ► key to store the channel.
12. Exit with the OSD key.

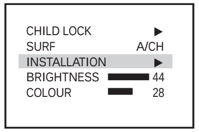
## How to deal with poor picture reception

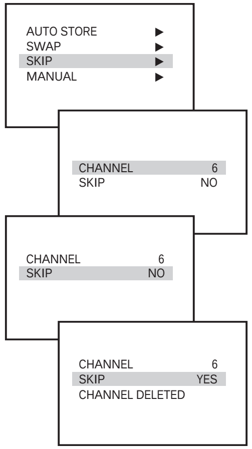
You can use these 3 ways to deal with poor picture reception of your TV

- Skip channels
- System selection (for multi and dual system sets only)
- Fine tuning

### Do the following steps to go into INSTALLATION menu.

1. Call up 1st level menu with the MENU key.
2. Scroll up with the ▲ key to highlight INSTALLATION.
3. Select INSTALLATION with the ◄ or ► key.


CHILD LOCK ►
SURF A/CH
INSTALLATION ►
BRIGHTNESS 44
COLOUR 28


AUTO STORE ►
SWAP ►
SKIP ►
MANUAL ►
CHANNEL 6
SKIP NO
CHANNEL 6
SKIP NO
CHANNEL 6
SKIP YES
CHANNEL DELETED

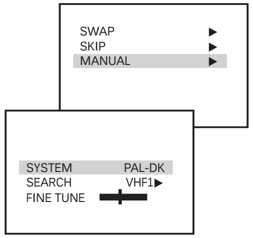
## Skip channels

This menu enables you to skip channels which have bad reception or channels which you do not watched often. Once a channel is skipped, you will not be able to select it with the ▲ CH or CH ▼ keys.

1. Scroll down with the ▼ key to highlight SKIP.
2. Select with the ◄ or ► key. CHANNEL is highlighted.
3. Enter a channel number.
4. Scroll down with the ▼ key to highlight SKIP.
5. Select YES with the ◄ or ► key. CHANNEL DELETED appears to confirm that the channel is skipped.

*To unskip channels, repeat step 3 to 5 but select NO instead of YES.*

6. Exit with the OSD key.



SWAP ▶
SKIP ▶
MANUAL ▶

SYSTEM PAL-DK
SEARCH VHF1▶
FINE TUNE

### System selection

For multi system sets:
This feature enables you to select either PAL-BG, PAL-I, PAL-DK, SECAM-DK, NTSC M or AUTO. If AUTO is selected, it means that the system is automatically selected according to the current transmission.

For dual system sets:
This feature enables you to select either PAL-DK or PAL-I.

For single system sets:
This feature is not selectable.

1. Scroll down with the ▽ key to highlight MANUAL . SYSTEM is highlighted.
2. Press the ◁ or ▷ key to select a suitable system.
3. Exit with the OSD key.

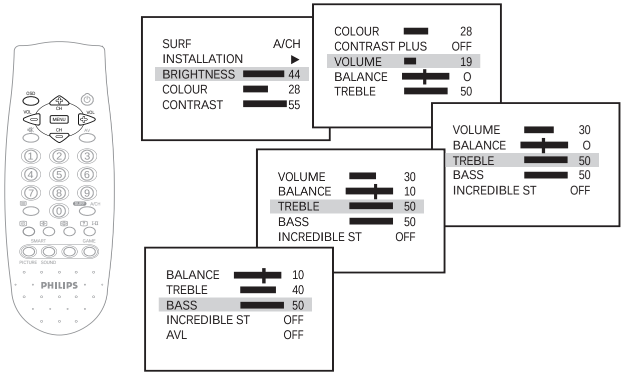
## Sound settings

### Personal settings

You can do adjustment on VOLUME, BALANCE, TREBLE and BASS of a picture via the 1st level menu. Adjustment on treble and bass will automatically be stored in the PERSONAL mode of the SMART SOUND feature.

### How to do adjustment

1. Call up 1st level menu with the MENU key.
2. Scroll up or down with the △ or ▽ key to highlight the item that you wish to adjust.
3. Select or adjust with the ◁ or ▷ key.
4. Exit with the OSD key.



SURF A/CH
INSTALLATION ▶
BRIGHTNESS 44
COLOUR 28
CONTRAST 55

COLOUR 28
CONTRAST PLUS OFF
VOLUME 19
BALANCE O
TREBLE 50

VOLUME 30
BALANCE O
TREBLE 50
BASS 50
INCREDIBLE ST OFF

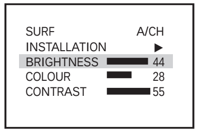
VOLUME 30
BALANCE 10
TREBLE 50
BASS 50
INCREDIBLE ST OFF

BALANCE 10
TREBLE 40
BASS 50
INCREDIBLE ST OFF
AVL OFF

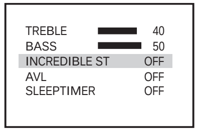
### Incredible stereo

A feature to enhance stereo sound. Adjustment done will automatically be stored in the PERSONAL mode of the SMART SOUND feature.

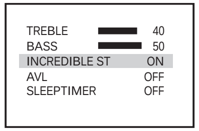
1. Call up 1st level menu with the MENU key.
2. Scroll down with the ▽ key to highlight INCREDIBLE ST.
3. Select ON with the ◁ or ▷ key.
4. Exit with the OSD key.



SURF A/CH
INSTALLATION ▶
BRIGHTNESS 44
COLOUR 28
CONTRAST 55



TREBLE 40
BASS 50
INCREDIBLE ST OFF
AVL OFF
SLEEPTIMER OFF

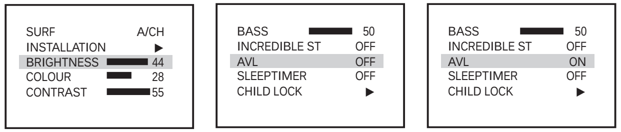


TREBLE 40
BASS 50
INCREDIBLE ST ON
AVL OFF
SLEEPTIMER OFF

## AVL-Auto Volume Leveller

This feature if switched on will automatically adjust any sudden changes in the TV's volume to a preset level.

1. Call up 1st level menu with the MENU key.
2. Scroll down with the ▽ key to highlight AVL.
3. Select ON with the ◁ or ▷ key.
4. Exit with the OSD key.



SURF A/CH
INSTALLATION ▶
BRIGHTNESS 44
COLOUR 28
CONTRAST 55

BASS 50
INCREDIBLE ST OFF
AVL OFF
SLEEPTIMER OFF
CHILD LOCK ▶

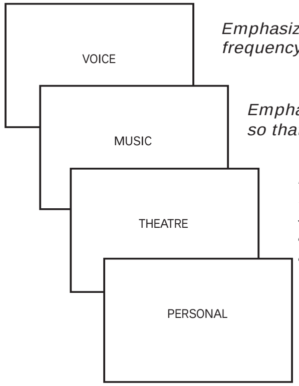
BASS 50
INCREDIBLE ST OFF
AVL ON
SLEEPTIMER OFF
CHILD LOCK ▶

## Smart Sound

These are some sound presets on the TV for your viewing pleasure. Press the SMART SOUND key repeatedly to select VOICE, MUSIC, THEATRE or PERSONAL*.

*(Note *: "NORMAL" for certain model)*

OSD
VOL
CH
MENU
AV
1
2
3
4
5
6
7
8
9
0
SURF
A/CH
SMART
GAME
PICTURE
SOUND
PHILIPS



*Emphasizes speech frequency.*

*Emphasizes bass frequency so that music is dynamic.*

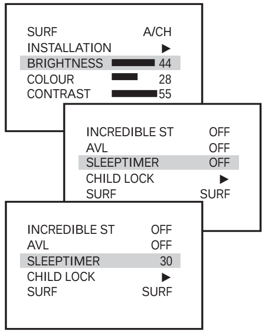
*Emphasizes low and high frequencies to give sensation to the action and a wider sound ambience.*

*Your personal sound settings.*

## Other features

### Sleeptimer

Sets timer to switch TV to standby in steps of 15 minutes to a maximum of 120 minutes. To disable timer, set to "OFF".



SURF A/CH
INSTALLATION ▶
BRIGHTNESS 44
COLOUR 28
CONTRAST 55

INCREDIBLE ST OFF
AVL OFF
SLEEPTIMER OFF
CHILD LOCK ▶
SURF SURF

INCREDIBLE ST OFF
AVL OFF
SLEEPTIMER 30
CHILD LOCK ▶
SURF SURF

To set timer

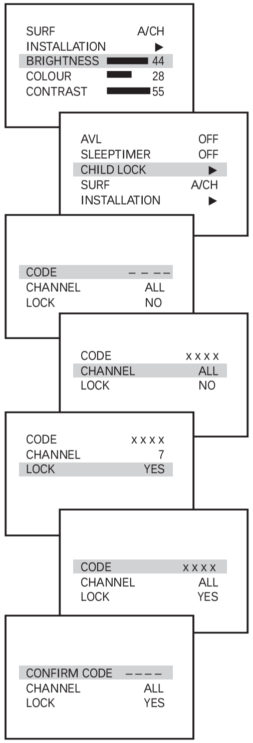
1. Call up 1st level menu with the MENU key.
2. Scroll down with the ▽ key to highlight SLEEPTIMER.
3. Select time period with the ◁ or ▷ key.
4. Exit with the OSD key.

### Child Lock

This feature enables you to lock channels which you do not wish others e.g. children to watch. You have a choice to lock all channels (inclusive of AV1 or AV2) or individual channel (up to a maximum of 5 channels). Once a channel is locked:

- if you call channels up with the CHANNEL ∨ or ∧ keys on the TV, there will be no picture and sound.
- access to the INSTALLATION sub-menu is disabled

You can only call up channels with your remote control. A message "LOCKED" and "CODE – – – –" appears on the screen each time you try to call up a channel with the controls on the TV. To bypass the lock mode, you will need to use your remote control to key in the 4-digit confidential code that you have entered when you locked it.



SURF A/CH
INSTALLATION ▶
BRIGHTNESS 44
COLOUR 28
CONTRAST 55

AVL OFF
SLEEPTIMER OFF
CHILD LOCK ▶
SURF A/CH
INSTALLATION ▶

CODE – – – –
CHANNEL ALL
LOCK NO

CODE x x x x
CHANNEL ALL
LOCK NO

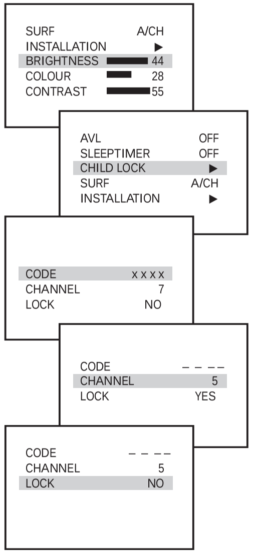
CODE x x x x
CHANNEL 7
LOCK YES

CODE x x x x
CHANNEL ALL
LOCK YES

CONFIRM CODE – – – –
CHANNEL ALL
LOCK YES

To lock channels

1. Call up 1st level menu with the MENU key.
2. Scroll down with the ▽ key to highlight CHILD LOCK.
3. Press ◁ or ▷ key to enter menu.
4. Key in the universal code 8888.
*If you do not key in the code, you will not be able to change anything on this menu.*
5. Press ◁ or ▷ key to select ALL (to lock all channels) or enter a channel number (to lock individual channels).
6. Scroll down with the ▽ key to highlight LOCK.
7. Press ◁ or ▷ key to select YES to lock the selected channel/s.
8. Repeat steps 5 to 7 for other channels which you wish to lock. Once you have completed, proceed to the next step.
9. Scroll up with the △ key to highlight CODE. Key in your own 4-digit confidential code. “CONFIRM CODE” appears.
10. Key in the 4 digits again to confirm and use it whenever you want to access to locked channels.
11. Exit with the OSD key.



SURF A/CH
INSTALLATION ▶
BRIGHTNESS 44
COLOUR 28
CONTRAST 55

AVL OFF
SLEEPTIMER OFF
CHILD LOCK ▶
SURF A/CH
INSTALLATION ▶

CODE x x x x
CHANNEL 7
LOCK NO

CODE – – – –
CHANNEL 5
LOCK YES

CODE – – – –
CHANNEL 5
LOCK NO

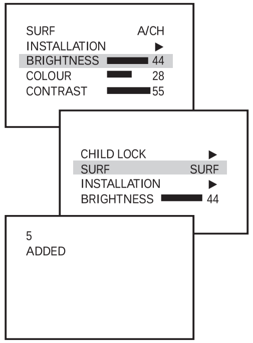
To unlock channels

1. Call up 1st level menu with the MENU key.
2. Scroll down with the ▽ key to highlight CHILD LOCK.
3. Press ◁ or ▷ key to enter menu.
4. Key in the 4-digit confidential code which you have entered when you activate CHILD LOCK mode.
*If you key in an incorrect code, all items in the child lock menu can be selected, but it is not possible to change any one of them. If you key in a correct code, CHANNEL will be automatically highlighted.*
*Tips : If you forget your confidential code, enter the universal code 8888.*
5. Key in a channel number which you wish to unlock.
6. Scroll down with the ▽ key to highlight LOCK.
7. Press ◁ or ▷ key to select NO to unlock the selected channel.
8. Repeat steps 5 to 7 for other channels which you wish to unlock. Once you have completed, proceed to the next step.
9. Exit with the OSD key.

## Surf

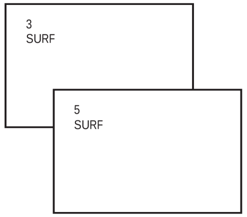
There are 2 selectable functions:

1. Surf : Create a list of channels (maximum 8) whereby when you press the SURF A/CH key on the remote control, you are able to quickly view through all these channels.
2. A/CH : When this is selected and if you press the SURF A/CH key on the remote control, you are able to see the previously watched channel.


SURF A/CH
INSTALLATION ▶
BRIGHTNESS 44
COLOUR 28
CONTRAST 55
CHILD LOCK ▶
SURF SURF
INSTALLATION ▶
BRIGHTNESS 44
5
ADDED

### Creating a surf list

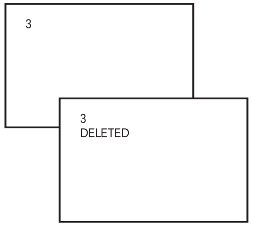
1. Call up 1st level menu with the MENU key.
2. Scroll up with the ⇧ key to highlight SURF.
3. Select SURF with the ⊖ or ⊕ key.
4. Exit with the OSD key.
5. Select a channel. Press the SURF key within 4 seconds or while the channel number is still being displayed. “ADDED“ appears below the channel number. This means the channel is added to the surf list.
6. Repeat step 5 for other channels which you wish to add to the surf list.


3
SURF
5
SURF

### How to call up channels in the surf list

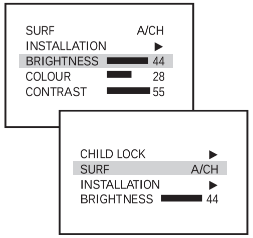
1. Press the SURF A/CH key once and the TV will switch to the next channel which is on the surf list OR

   Press and hold the SURF A/CH key to cycle through all the channels on the surf list.



### Deleting channels from a surf list

1. Press the SURF A/CH key to call up channels in the surf list.
2. As soon as you find the channel you wish to delete, press the SURF A/CH key within 4 seconds or while the channel number is still being displayed. “DELETED“ appears below the channel number. This means the channel is deleted from the surf list.
3. Repeat step 1 to 2 for other channels which you wish to delete from the surf list.


SURF A/CH
INSTALLATION ▶
BRIGHTNESS 44
COLOUR 28
CONTRAST 55
CHILD LOCK ▶
SURF A/CH
INSTALLATION ▶
BRIGHTNESS 44

### Selecting alternate channel (A/CH)

1. Call up 1st level menu with the MENU key.
2. Scroll up with the ⇧ key to highlight SURF.
3. Select A/CH with the ⊖ or ⊕ key.
4. Exit with the OSD key.

When you are viewing a channel (e.g channel number 6) and if you wish to go back to the previous channel (e.g. channel number 3), press the SURF A/CH key once. If you wish to go back to channel number 6 again, press the SURF A/CH key again.

# 11 Abbreviations

| | |
|---|---|
| (R-Y)_OUT | R-Y output from chroma demodulator |
| uC | Microcomputer |
| AQUA | Aquadaq layer on the outside of the picture tube |
| AV_MUTE | Signal to mute the sound on the Audio-out cinch |
| AVL_AV2/AVL | Switching signal from UP to the Auto Volume leveller on the ITT on BTSC Panel or Rear Cinch I/P 2 width CVBS. R and Sound |
| B_TXT_OSD | Blue TXT or OSD signal from (C to the video controller IC7225-5C |
| BASS | Control signal for BASS |
| BCI | Beam Current information |
| BG/1_or_BG/0 K | Monochrome TV system sound carrier + 5.5 MHz (BG), Sound carrier + 6 MHz(I), Sound carrier + 6.5 MHz (DK) |
| BL_TXT_OSD | Fast blanking signal to IC7725-5C to display OSD and TXT |
| BLACKSTR_SW | Black stretch switch |
| BS1 | TV band selection 1 signal |
| BS2 | TV band selection 2 signal |
| CHROMA_O/NTSC_SW | Switch on signal for NTSC chroma oscillator (3.575 MHz) |
| CHROMA_1/BG/L | Switch on signal for BG/L chroma oscillator (3.582 MHz) |
| CHROMA_1/STATUS | Switch on signal for NTSC chroma oscillator (3.579 MHz) |
| CHROMA_2/STATUS | Signal to select the correct system in case of trinorma |
| CVBS_EXT1 | CVBS external 1 input signal |
| CVBS_EXT2 | CVBS external 2 signal |
| CVBS_IN | CVBS internal 1 (from tuner) |
| CVBS_OUT | CVBS output signal |
| CVBS_OUT_1 | CVBS output signal 1 |
| CVBS_SOUND | CVBS for inter carrier sound detector |
| CVBS_TXT | CVBS for TXT processing in uC |
| DISCHARGE | To have a fast discharge after switching off the set |
| EAR | Earth |
| EEPROM | Electrical Erasable Programmable Read Only Memory |
| ESD | Electrical Static Discharge |
| ff | Filament (heater voltage) from LOT to the picture tube |
| FL_A | Filament voltage for CRT |
| G_TXT_OSD | Green TXT or OSD signal from the uC to IC7225-5C |
| GND | Ground |
| GRD_LOT | Ground of LOT |
| HOR.FLYBACK | Horizontal flyback pulse used for looking the horizontal oscillator |
| 12C | Digital Control bus of the microcomputer |
| IF | Intermediate frequency signal for sound processing |
| INT/EXT | Switching signal for Internal or external audio + video switching |
| L_EXT1 | Audio left external 1 |
| LEFT_OUT | Audio left out |
| MOD_L_1N1 | SCART I/P 1 in left |
| MOD_L_1N2 | SCART I/P 2 in left |
| MOD_R_1N1 | SCART I/P 1 in righ |
| MOD_L_1N2 | SCART I/P 2 in left |
| MONO/STROBE/BG_L | Strobe signal for HEF 4094 on multi-mono sound panel |
| MONO_OUT | Audio mono out |
| NTSC | NTSC colour system |
| PAL/SECAM | PAL or SECAM colour system |
| R_TXT_OSD | Blue TXT or OSD signal from the uC to the video controller IC7225 5C |
| RAM | Random Access Memory |
| RESET1 | Reset signal for the uC |
| RF_AGC | Automatic gain control signal I for tuner |
| RIGHT_OUT | Audio right ou |
| ROM | Read Only Memory |
| SAM | Service Alignment Mode |
| SANDCASTLE | Sand castle signal from IC7225-5D to delay line IC7255 and SECAM chrominance decoder IC7241. |
| SCL | Clock line of the 12C-bus |
| SDA | Data line of the 12C-bus |
| SDM | Service Default Mode; predefined mode for faultfinding |
| SECAM_REF | SECAM reference |
| SID/STA/LL | Sound identification / stereo available / france system "L" |
| SIF | Sound IF signal for FM demodulator |
| STANDBY | Switching signal from uC "low" for standby (power supply will be switched to stand-by mode), "high" for normal operation |
| TREBLE | Treble control signal |
| V_TUNE | Tuning voltage for tuner |
| VFB | Vertical flyback pulse |
| VFL | 50Hz vertical flyback pulse used to inform the uC that flyback takes place. This is important for OSD and TXT |
| VG2 | Voltage on grid 2 of the picture tube |
| VOLUME | Control signal (from uC, but on DC level via RC nework) for volume control of sound processing in sound panel |

# 12 Spareparts list

## Mainpanel

### Various

| | | |
|---|---|---|
| 0136Δ | 4822 492 70289 | SPRING K12 |
| 0139Δ | 4822 276 13603 | SWITCH,MAINS |
| 0140Δ | 4822 256 92053 | FUSE HOLDER CLICK (PROM) |
| 0141Δ | 4822 265 20723 | B2P3-VH |
| 0142Δ | 4822 265 20723 | B2P3-VH |
| 0151 | 4822 256 10336 | LED HOLDER |
| 0177 | 4822 492 70788 | FIX IC |
| 0189 | 4822 402 10844 | PCB RELIEF BRACKET |
| 0191 | 4822 267 31014 | HEADPHONE SOCKET |
| 0191 | 4822 267 51391 | F PHONE 3.5MM STEREO |
| 0210Δ | 4822 492 70289 | SPRING K12 |
| 0211Δ | 4822 492 70289 | SPRING K12 |
| 0231 | 4822 265 10453 | 9P |
| 1000Δ | 4822 210 10737 | UV1355/I |
| 1000Δ | 4822 210 10771 | UV1355S/I |
| 1000Δ | 4822 210 10803 | UV1336B/AIS |
| 1000Δ | 4822 210 10804 | UV1336B/AFS |
| 1000Δ | 4822 210 10814 | UV1336B/A F |
| 1007Δ | 4822 212 11691 | FRAME 29" |
| 1015 | 4822 242 10357 | OFWK2960M |
| 1015 | 4822 242 10874 | 45.750 000 MHz |
| 1015 | 4822 242 81556 | B39380-K2953-M100 |
| 1015 | 4822 242 81964 | B39389-G1984-M100 |
| 1102Δ | 4822 242 10316 | SFSF6,5MHz B-TF21 |
| 1104 | 4822 242 10314 | SFSH5,5MHz B-TF21 |
| 1104 | 4822 242 10362 | SFSH6,0MHz B-TF21 |
| 1104 | 4822 242 10363 | SFSH4,5MHz B-TF21 |
| 1206 | 4822 242 81572 | TPS6,0MB-TF21 |
| 1207 | 4822 242 81712 | TPWA04B |
| 1207 | 4822 242 81978 | TPS4,5MB-TF21 |
| 1208 | 4822 242 81301 | TPS6,5MB-TF21 |
| 1209 | 4822 242 81978 | TPS4,5MB-TF21 |
| 1275 | 4822 242 10327 | HC49/U 3M575611 |
| 1275 | 4822 242 10356 | 4,433619MHz HC49/U |
| 1275 | 4822 242 10695 | 4 433 619 MHz |
| 1277 | 4822 242 10355 | 3,579545MHz HC49/U |
| 1277 | 4822 242 10776 | 3.579 545 MHz |
| 1278 | 4822 242 10326 | HC49/U 3M582056 |
| 1300 | 4822 242 10359 | CSB503F58 |
| 1500 | 4822 070 35002 | 218005.(5A) |
| 1572Δ | 4822 071 51002 | 19372(1A) |
| 1600 | 4822 276 13775 | SWITCH |
| 1601 | 4822 276 13775 | SWITCH |
| 1602 | 4822 276 13775 | SWITCH |
| 1603 | 4822 276 13775 | SWITCH |
| 1670 | 4822 218 11573 | GP1U28QP |
| 1681 | 4822 242 10694 | 12 000 000 MHz |

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| | | |
|---|---|---|
| 2002 | 4822 124 80791 | µF 470µF 16V 20% 85C DXH=8X11.5 |
| 2050 | 4822 126 13486 | µF 15pF 2% 63V |
| 2128 | 5322 126 10465 | µF 3.9nF 10% 50V |
| 2198 | 4822 122 33805 | µF 330pF 10% 63V |
| 2199 | 4822 122 33805 | µF 330pF 10% 63V |
| 2209 | 4822 126 13473 | µF 220nF 80-20% 50V |
| 2215 | 4822 126 13061 | µF 220nF 20% 25V |
| 2224 | 4822 124 11576 | µF 220µF 20% 25V |
| 2275 | 4822 126 13486 | µF 15pF 2% 63V |
| 2277 | 4822 126 13486 | µF 15pF 2% 63V |
| 2278 | 4822 126 13486 | µF 15pF 2% 63V |
| 2283Δ | 4822 126 12944 | µF 47nF 10% 50V |
| 2284Δ | 4822 126 12944 | µF 47nF 10% 50V |
| 2285Δ | 4822 126 12944 | µF 47nF 10% 50V |
| 2315 | 4822 126 13482 | µF 470nF 80/20% 16V |
| 2316 | 4822 126 13482 | µF 470nF 80/20% 16V |
| 2323Δ | 4822 121 43823 | µF 470nF 5% 50V |
| 2324Δ | 4822 121 43823 | µF 470nF 5% 50V |
| 2325Δ | 4822 121 43823 | µF 470nF 5% 50V |
| 2326Δ | 4822 121 43823 | µF 470nF 5% 50V |
| 2327 | 4822 126 13482 | µF 470nF 80/20% 16V |
| 2328 | 4822 126 13482 | µF 470nF 80/20% 16V |
| 2337 | 4822 122 32646 | µF 5.6nF 10% 50V |
| 2339 | 4822 126 14043 | µF 1µF 20% 16V |
| 2342 | 4822 124 80061 | µF 1000µF 20% 25V |
| 2346 | 4822 126 14043 | µF 1µF 20% 16V |
| 2347 | 4822 126 14043 | µF 1µF 20% 16V |
| 2348 | 4822 126 14043 | µF 1µF 20% 16V |
| 2349 | 4822 126 13473 | µF 220nF 80-20% 50V |
| 2351 | 4822 126 13482 | µF 470nF 80/20% 16V |
| 2353 | 4822 124 81151 | µF 22µF 50V |
| 2354 | 4822 126 13473 | µF 220nF 80-20% 50V |
| 2355 | 4822 126 14043 | µF 1µF 20% 16V |
| 2357 | 4822 126 13482 | µF 470nF 80/20% 16V |
| 2359 | 4822 126 13482 | µF 470nF 80/20% 16V |
| 2369Δ | 4822 126 12944 | µF 47nF 10% 50V |
| 2383 | 4822 126 14043 | µF 1µF 20% 16V |
| 2385 | 4822 126 14043 | µF 1µF 20% 16V |
| 2387 | 4822 126 13482 | µF 470nF 80/20% 16V |
| 2388 | 4822 122 32646 | µF 5.6nF 10% 50V |
| 2401 | 5322 121 42386 | µF 100nF 5% 63V |
| 2402 | 5322 121 42386 | µF 100nF 5% 63V |
| 2403 | 4822 124 40255 | µF 100µF 20% 63V |
| 2404Δ | 4822 126 12171 | µF 3.3nF 20% 1KV |
| 2409 | 4822 121 42408 | µF 220nF 5% 63V |
| 2409 | 4822 121 42868 | µF 220nF 5% 50V |
| 2422 | 5322 122 32331 | µF 1nF 10% 100V |
| 2426 | 5322 121 42386 | µF 100nF 5% 63V |
| 2448Δ | 4822 122 31173 | µF 220pF 10% 500V |
| 2450 | 4822 124 41739 | µF 47µF 20% 160V |
| 2451Δ | 4822 122 30103 | µF 22nF 80% 63V |
| 2451 | 4822 126 13513 | µF 8.2nF 10% 50V |
| 2456 | 4822 121 43526 | µF 47nF 5% 250V |
| 2457Δ | 4822 121 10518 | µF 250V 390nF 5% |
| 2457Δ | 4822 121 43888 | µF 360nF 5% 250V |
| 2458 | 4822 124 41984 | µF 10µF 250V |
| 2459Δ | 4822 126 13185 | µF 680pF 10% 500V |
| 2460 | 4822 126 12638 | µF 6.8nF 10% B 50V |
| 2461 | 4822 122 31175 | µF 1nF 10% 500V |
| 2462 | 4822 121 43526 | µF 47nF 5% 250V |
| 2463Δ | 4822 126 12239 | µF 560pF 10% 2KV |
| 2463Δ | 4822 126 14053 | µF 1nF 10% 2KV |
| 2463Δ | 4822 126 14184 | µF 820pF 10% 2KV |
| 2464 | 4822 121 10739 | µF 2.2µF 5% 160V MPP479 |
| 2465Δ | 4822 121 70637 | µF 8.2nF 5% 1600V |
| 2465Δ | 4822 121 70649 | µF 9.1nF 5% 1.6KV |
| 2466 | 4822 121 40483 | µF 10nF 10% 400V |
| 2467Δ | 4822 121 40488 | µF 22nF 10% 400V |
| 2468Δ | 5322 121 42532 | µF 18nF 10% 400V |
| 2468Δ | 5322 121 44151 | µF 33nF 10% 400V |
| 2469 | 4822 121 51319 | µF 1µF 10% 63V |
| 2470 | 4822 122 31177 | µF 470pF 10% 500V |
| 2471 | 4822 121 51252 | µF 470nF 5% 63V |
| 2472 | 5322 124 41379 | µF 2.2µF 20% 50V |
| 2475 | 4822 126 14096 | µF 560nF 5% 250V |
| 2480Δ | 4822 121 40518 | µF 100nF 10% 250V |
| 2481Δ | 4822 121 43823 | µF 470nF 5% 50V |
| 2484 | 5322 121 42386 | µF 100nF 5% 63V |
| 2485 | 4822 124 11534 | µF 4.7µF 20% 250V |
| 2486 | 4822 124 80791 | µF 470µF 16V 20% 85C DXH=8X11.5 |
| 2487 | 4822 124 11769 | µF 220µF 20% 50V |
| 2488 | 4822 124 80791 | µF 470µF 16V 20% 85C DXH=8X11.5 |
| 2489 | 4822 124 80062 | µF 470µF 20% 35V |
| 2490 | 4822 122 31177 | µF 470pF 10% 500V |
| 2491 | 4822 122 31177 | µF 470pF 10% 500V |
| 2500Δ | 4822 126 13589 | µF 470nF 275V |
| 2501 | 4822 121 70141 | µF 33nF 5% 400V |
| 2502Δ | 4822 126 12793 | µF 2.2nF 10% 2KV |
| 2504Δ | 4822 126 12793 | µF 2.2nF 10% 2KV |
| 2505Δ | 4822 126 12793 | µF 2.2nF 10% 2KV |
| 2507Δ | 4822 126 11524 | µF 1.5nF 10% 1KV |
| 2508 | 4822 121 10486 | µF 330µF 20% 450V |
| 2508Δ | 4822 124 41748 | µF 220µF 20% 400V |
| 2508Δ | 4822 124 42168 | µF 330µF 400V |
| 2510Δ | 4822 126 11524 | µF 1.5nF 10% 1KV |
| 2511Δ | 4822 126 13337 | µF 220pF 10% 1KV |
| 2517 | 5322 122 32331 | µF 1nF 10% 100V |
| 2518Δ | 4822 122 50116 | µF 470pF 10% 1KV |
| 2524 | 4822 122 33805 | µF 330pF 10% 63V |
| 2530 | 4822 124 11571 | µF 1µF 20% 50V |
| 2531 | 4822 121 10738 | µF 1nF 2% 50V |
| 2540 | 4822 124 80059 | µF 100µF 20% 25V |
| 2541 | 4822 124 81089 | µF 2.2µF 20% 160V |
| 2545Δ | 4822 126 14049 | µF 1.5nF 20% 250V |
| 2550Δ | 4822 126 14149 | µF 330pF 10%R 1KV |
| 2551 | 4822 124 42336 | µF 47µF 20% 160V |
| 2554 | 4822 126 13061 | µF 220nF 20% 25V |
| 2560Δ | 4822 126 14149 | µF 330pF 10%R 1KV |
| 2561 | 4822 124 81145 | 16V S 1000µF PM20 |
| 2562 | 4822 124 41097 | µF 220µF 20% 16V |
| 2563 | 4822 124 80499 | µF 100µF 20% 16V |
| 2571 | 4822 124 80707 | µF 2200µF 20% 25V |
| 2575 | 4822 126 14087 | µF 100nF 10% 63V |
| 2601 | 4822 126 13061 | µF 220nF 20% 25V |
| 2610 | 4822 126 13473 | µF 220nF 80-20% 50V |
| 2615 | 4822 126 13473 | µF 220nF 80-20% 50V |
| 2650 | 4822 126 13482 | µF 470nF 80/20% 16V |
| 2660 | 5322 126 10184 | µF 680P 5% 50V. |
| 2661 | 5322 126 10184 | µF 680P 5% 50V. |
| 2680 | 4822 126 13061 | µF 220nF 20% 25V |
| 2684 | 4822 126 13061 | µF 220nF 20% 25V |

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|---|---|---|
| 3171 | 4822 051 20394 | 390k 5% 0.1W |
| 3178 | 4822 051 20394 | 390k 5% 0.1W |
| 3234Δ | 4822 052 10228 | 2Ω2 5% 0.33W |
| 3249 | 4822 051 20106 | 10M 5% 0.1W |
| 3277 | 4822 117 11437 | 8k2 1% 0.1W |
| 3342 | 4822 051 20475 | 4M7 5% 0.1W |
| 3346Δ | 4822 051 20121 | 120Ω 5% 0.1W |
| 3360Δ | 4822 051 20121 | 120Ω 5% 0.1W |
| 3401 | 4822 111 31051 | 3Ω3 5% |
| 3402 | 4822 111 31051 | 3Ω3 5% |
| 3403 | 4822 111 31051 | 3Ω3 5% |
| 3405Δ | 4822 050 21802 | 1k8 1% 0.6W |
| 3405 | 4822 050 22202 | 2k2 1% 0.6W |
| 3407Δ | 4822 050 21802 | 1k8 1% 0.6W |
| 3407 | 4822 050 22202 | 2k2 1% 0.6W |
| 3409Δ | 4822 052 10158 | 1Ω5 5% 0.33W |
| 3430Δ | 4822 052 10478 | 4Ω7 5% 0.33W |
| 3443 | 4822 051 20684 | 680k 5% 0.1W |
| 3451Δ | 4822 053 11479 | 47Ω 5% 2W |
| 3453 | 4822 117 12822 | 4Ω7 5% 5W |
| 3454 | 4822 053 11333 | 33k 5% 2W |
| 3462 | 4822 117 12514 | 6k8 5% 5W |
| 3465Δ | 4822 052 10109 | 10Ω 5% 0.33W |
| 3480 | 4822 050 22703 | 27k 1% 0.6W |
| 3481Δ | 4822 050 24303 | 43k 1% 0.6W |
| 3481 | 4822 050 28203 | 82k 1% 0.6W |
| 3482Δ | 4822 050 24303 | 43k 1% 0.6W |
| 3482 | 4822 050 25603 | 56k 1% 0.6W |
| 3485Δ | 4822 052 10478 | 4Ω7 5% 0.33W |
| 3486Δ | 4822 052 11108 | 1Ω 5% 0.5W |
| 3487Δ | 4822 052 11108 | 1Ω 5% 0.5W |
| 3488Δ | 4822 052 10478 | 4Ω7 5% 0.33W |
| 3490Δ | 4822 052 10338 | 3Ω3 5% 0.33W |
| 3491Δ | 4822 052 11108 | 1Ω 5% 0.5W |
| 3492Δ | 4822 052 11108 | 1Ω 5% 0.5W |
| 3501 | 4822 117 12181 | 470Ω 20% 0.5W |
| 3502Δ | 4822 053 21225 | 2M2 5% 0.5W |
| 3504 | 4822 117 12728 | 9Ω 200V S 100R |
| 3505 | 4822 252 60151 | SURGE PROTECT DSP-510N-A21F A |
| 3507 | 4822 116 82776 | 2Ω2 |
| 3509 | 4822 117 11488 | 33k 5% 3W |
| 3510 | 4822 117 11488 | 33k 5% 3W |
| 3511 | 4822 117 12568 | RESISTOR 7 WATT(MOX) |
| 3513 | 4822 117 11719 | 180k |
| 3514 | 4822 050 28204 | 820k 1% 0.6W |
| 3515Δ | 4822 117 12765 | 4Ω7 20% 3W1 |
| 3518Δ | 4822 116 83027 | R22 5% 3W |
| 3525Δ | 4822 052 10339 | 33Ω 5% 0.33W |
| 3542Δ | 4822 053 21475 | 4M7 5% 0.5W |
| 3552Δ | 4822 051 20332 | 3k3 5% 0.1W |
| 3553Δ | 4822 051 20121 | 120Ω 5% 0.1W |
| 3554 | 4822 117 11139 | 1k5 1% 0.1W |
| 3571 | 4822 050 21504 | 150k 1% 0.6W |
| 3571 | 4822 050 21604 | 160k 1% 0.6W |
| 3572 | 4822 101 11186 | 470Ω 30%LIN 0.1W |
| 3601 | 4822 116 90885 | 8k2X6 |
| 3602 | 4822 117 12168 | 2k2 X 6 |
| 3603 | 4822 117 12167 | 8k2 X 12 |
| 3685 | 4822 051 20683 | 68k 5% 0.1W |

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|---|---|---|
| 5003 | 4822 157 11518 | 5.6µH 5% 2.3X3.4 |
| 5040 | 4822 157 70439 | FOR MK2 AND ANUB S. |
| 5051 | 4822 152 20547 | IND FXD LAL04 A 0U68 PM20 A |
| 5054 | 4822 157 11519 | 1.2µH 5% 2.3X3.4 |
| 5101 | 4822 157 11515 | 12µH 5% 2.3X3.4 |
| 5101 | 4822 157 11516 | 15µH 5% 2.3X3.4 |
| 5101 | 4822 157 11526 | 22µH 5% 2.3X3.4 |
| 5205 | 4822 157 11517 | 10µH 5% 2.3X3.4 |
| 5206 | 4822 157 11518 | 5.6µH 5% 2.3X3.4 |
| 5206 | 4822 157 11524 | 8.2µH 5% 2.3X3.4 |
| 5260 | 4822 157 11326 | IF COIL 77.8mH z |
| 5260 | 4822 157 11514 | 76mH z |
| 5260 | 4822 157 11527 | IFT COIL 91.5mH z |
| 5260 | 4822 157 11528 | IFT COIL 77.8mH z |
| 5445Δ | 4822 146 10961 | FLYBACK TRANSFORMER |
| 5445Δ | 4822 146 10963 | FLYBACK TRANSFORMER |
| 5445Δ | 4822 146 10966 | FLYBACK TRANSFORMER POWER |
| 5451 | 4822 157 11521 | 33µH 10% 8X10 |
| 5451 | 4822 157 71266 | 27µH |
| 5457 | 4822 157 11522 | LIN. CORRECTOR COIL |
| 5457 | 4822 157 11546 | LINEARITY CORRECTOR COIL |
| 5461Δ | 4822 142 40351 | LINE DRIVE TRAFO -CU15 |
| 5463Δ | 4822 157 71405 | BRIDGE COIL -CI15 |
| 5465Δ | 4822 140 10509 | BRIDGE COIL U15 |
| 5470Δ | 4822 158 10728 | TRANSF. 11µH |
| 5471 | 4822 157 11547 | 1000µH 10% 8X10 |
| 5480 | 5322 157 51687 | FXDIND A 04 39µH PM10 (UAW) |
| 5500Δ | 4822 157 11523 | LINE 5mH /2A |
| 5502 | 4822 157 10476 | DMF-2820H |
| 5502 | 4822 157 11538 | 10mH 2A |
| 5515 | 4822 157 11477 | LAL02TB2R2J |
| 5516 | 4822 157 60171 | HF70BTL3.5X9R |
| 5518 | 4822 526 10704 | 100mH z |
| 5520 | 4822 526 10704 | 100mH z |
| 5540 | 4822 157 71249 | IND FXD LAL02 A 4U7 PM5 A |
| 5545Δ | 4822 146 10964 | TFM SMT 130V |
| 5545Δ | 4822 157 11529 | SMT LAYER WIRE |
| 5550 | 4822 157 60171 | HF70BTL3.5X9R |
| 5551 | 4822 157 71401 | 27µH |
| 5572 | 4822 157 60171 | HF70BTL3.5X9R |
| 5573 | 4822 157 60171 | HF70BTL3.5X9R |
| 5574 | 4822 157 11327 | 1U 20% |
| 5574 | 4822 157 11408 | 2.2µH 10% 8X10 |
| 5603 | 4822 157 11524 | 8.2µH 5% 2.3X3.4 |
| 5620 | 4822 157 11525 | 6.8µH 5% 2.3X3.4 |

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|---|---|---|
| 6040 | 5322 130 34955 | BA482 |
| 6112Δ | 4822 130 83757 | BAS216 |
| 6114Δ | 4822 130 83757 | BAS216 |
| 6263Δ | 4822 130 83757 | BAS216 |
| 6264Δ | 4822 130 83757 | BAS216 |
| 6265Δ | 4822 130 83757 | BAS216 |
| 6401 | 4822 130 42488 | BYD33D |
| 6402Δ | 4822 130 31024 | BZX79-B18 |
| 6403 | 4822 130 42488 | BYD33D |
| 6421 | 4822 130 34258 | BZX79-B56 |
| 6460Δ | 4822 130 41275 | BY228 |
| 6461Δ | 4822 130 41602 | BYW95C |
| 6465 | 4822 130 42606 | BYD33J |
| 6466 | 4822 130 42606 | BYD33J |
| 6470 | 4822 130 30862 | BZX79-B9V1 |
| 6480 | 4822 130 34379 | BZX79-B27 |
| 6485 | 4822 130 42488 | BYD33D |
| 6486 | 5322 130 31938 | BYV27-200 |
| 6487 | 4822 130 42488 | BYD33D |
| 6488 | 4822 130 42488 | BYD33D |
| 6490 | 5322 130 31938 | BYV27-200 |
| 6505Δ | 4822 130 10741 | GBU6J |
| 6505 | 4822 130 11185 | GBU4J |
| 6507 | 4822 130 42606 | BYD33J |
| 6508 | 4822 130 42606 | BYD33J |
| 6511 | 4822 130 41487 | BYV95C |
| 6514Δ | 4822 130 31024 | BZX79-B18 |
| 6515 | 4822 130 42606 | BYD33J |
| 6517 | 4822 130 42606 | BYD33J |
| 6550 | 4822 130 10754 | BY229X-600 |
| 6560 | 4822 130 10256 | EGP20DL-5300 |
| 6570 | 4822 130 10256 | EGP20DL-5300 |
| 6590 | 4822 130 10256 | EGP20DL-5300 |
| 6653 | 4822 130 34382 | BZX79-B8V2 |
| 6663Δ | 4822 130 82029 | LTL307P |

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|---|---|---|
| 7001 | 5322 130 60508 | BC857B |
| 7002 | 5322 130 60508 | BC857B |
| 7003 | 5322 130 60508 | BC857B |
| 7004 | 5322 130 60508 | BC857B |
| 7005 | 4822 130 60511 | BC847B |
| 7101 | 4822 130 60511 | BC847B |
| 7115 | 4822 130 60511 | BC847B |
| 7117 | 4822 130 60511 | BC847B |
| 7118 | 4822 130 60511 | BC847B |
| 7204 | 4822 130 60511 | BC847B |
| 7214 | 4822 130 60511 | BC847B |
| 7215 | 4822 130 60511 | BC847B |
| 7216 | 5322 130 60508 | BC857B |
| 7217 | 5322 130 60508 | BC857B |
| 7220 | 4822 130 60511 | BC847B |
| 7225 | 4822 209 15685 | TDA8844/N1 |
| 7225 | 4822 209 15828 | TDA8347C/N3 |
| 7225 | 4822 209 16309 | TDA8377/N3 |
| 7225 | 4822 209 16311 | TDA8375A/N3 |
| 7255 | 4822 209 12635 | TDA4665/V4 |
| 7260 | 5322 130 60508 | BC857B |
| 7277Δ | 4822 130 42353 | BSF19-F2 |
| 7278Δ | 4822 130 42353 | BSF19-F2 |
| 7310 | 4822 209 33293 | TDA9860/V2 |
| 7311 | 4822 209 13646 | TDA7057AQ/N2 |
| 7312 | 4822 209 32918 | AN7318S |
| 7314 | 4822 130 60511 | BC847B |
| 7315 | 4822 209 13181 | TDA9850/V1 |
| 7317Δ | 4822 130 40981 | BC337-25 |
| 7401 | 4822 209 13176 | TDA9302H |
| 7401 | 4822 209 16352 | STV9379FA |
| 7420 | 5322 130 60508 | BC857B |
| 7460 | 4822 130 63569 | BU1508DX |
| 7461 | 4822 130 42159 | BF819 |
| 7470 | 4822 130 63726 | MTP3055EFI |
| 7480Δ | 4822 130 40981 | BC337-25 |
| 7481 | 4822 130 44568 | BC557B |
| 7482 | 5322 130 60508 | BC857B |
| 7518 | 4822 130 63698 | STH8NA60FI |

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|---|---|---|
| 7520 | 4822 209 15684 | MC44603AP |
| 7541 | 4822 209 15829 | TDA8139 |
| 7542 | 5322 130 60508 | BC857B |
| 7570 | 4822 209 81397 | TL431CLPST |
| 7581∆ | 4822 209 71634 | TCDT1101G |
| 7600 | 4822 209 15831 | P87C766BDR/01 |
| 7600 | 4822 209 16308 | P87C770AAR/40 |
| 7600 | 4822 209 16312 | SAA5297PS/051 |
| 7600 | 4822 209 16459 | P83C366BDR/016 |
| 7603 | 4822 130 60511 | BC847B |
| 7608 | 4822 130 60511 | BC847B |
| 7610∆ | 4822 209 73852 | PMBT2369 |
| 7620 | 4822 209 15822 | ST24W04B6 |
| 7650 | 4822 130 60511 | BC847B |
| 7651 | 4822 130 60511 | BC847B |
| 7681 | 4822 130 60511 | BC847B |
| 7682 | 4822 130 60511 | BC847B |

## CRT panel

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|---|---|---|
| 2830 | 4822 121 51473 | µF 470nF 20% 63V |
| 2840 | 4822 124 11565 | µF 10µF 20% 250V |
| 2841 | 4822 126 13599 | µF 3.3nF 10% 500V |
| 2843∆ | 4822 126 12278 | µF 3300pF 10%) 2KV |
| 2845 | 4822 122 31175 | µF 1nF 10% 500V |

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|---|---|---|
| 3832 | 4822 117 12516 | 680Ω 2%0.5W |
| 3834 | 4822 117 12516 | 680Ω 2%0.5W |
| 3836 | 4822 117 12516 | 680Ω 2%0.5W |
| 3840∆ | 4822 052 10109 | 10Ω 5% 0.33W |
| 3841∆ | 4822 052 10108 | 1Ω 5% 0.33W |
| 3842∆ | 4822 052 10108 | 1Ω 5% 0.33W |
| 3843 | 4822 117 11896 | 1k5 20% 0.5W |
| 3845 | 4822 117 13016 | 1M A/50V MAX 115V |

## Audio panel

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|---|---|---|
| 7830 | 4822 209 16321 | TDA6107Q/N1 |
| 1204 | 4822 242 10769 | 18.432 000 MHz |

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|---|---|---|
| 2214 | 4822 126 13486 | µF 15pF 2% 63V |
| 2216 | 4822 126 13061 | µF 220nF 20% 25V |
| 2217 | 4822 126 13061 | µF 220nF 20% 25V |
| 2220 | 4822 126 13061 | µF 220nF 20% 25V |
| 2221 | 4822 126 13061 | µF 220nF 20% 25V |
| 2225 | 5322 122 32286 | µF 3.3pF 5% 50V |
| 2226 | 5322 122 32286 | µF 3.3pF 5% 50V |
| 2239∆ | 4822 122 33172 | µF 390pF 5% 50V |
| 2240∆ | 4822 122 33172 | µF 390pF 5% 50V |

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|---|---|---|
| 3243 | 4822 117 11437 | 8k2 1% 0.1W |
| 3244 | 5322 117 12487 | 1k RC12G 1% 0.125W |
| 3247∆ | 4822 052 10109 | 10Ω 5% 0.33W |

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|---|---|---|
| 5206 | 4822 157 11515 | 12µH 5% 2.3X3.4 |

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|---|---|---|
| 7202 | 4822 209 15832 | MSP3410D-PP-B4 |
| 7202 | 4822 209 16307 | MSP3400C-C8 |
| 7209 | 4822 130 60511 | BC847B |
| 7214∆ | 4822 130 40981 | BC337-25 |
| 7215 | 4822 130 60511 | BC847B |
| 7216 | 4822 130 60511 | BC847B |